Electrical World

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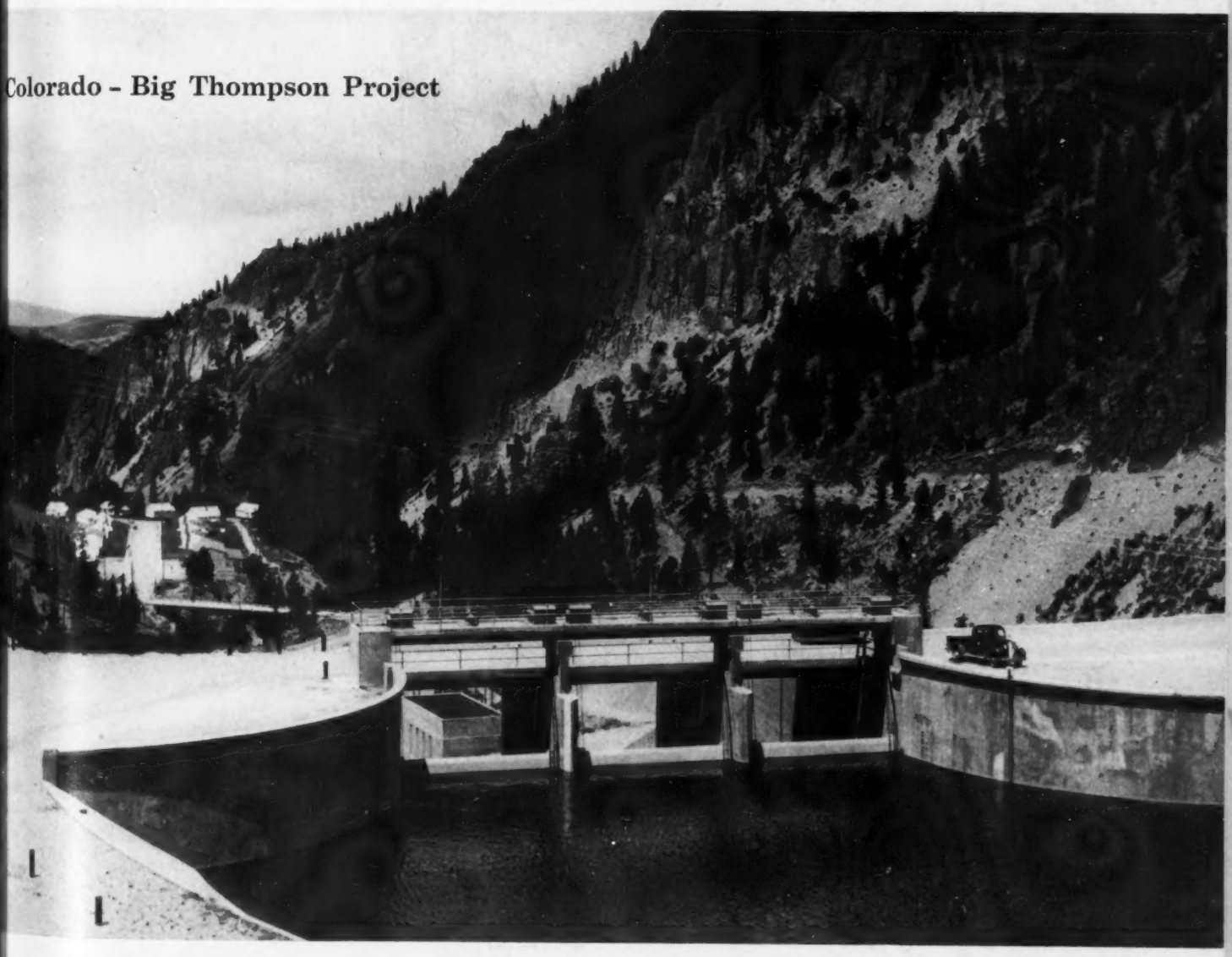

Colorado - Big Thompson Project

June 21, 1947

Features

New Standards for Small Farm Welders
Better Ways to Place Infrared Lamps in Ovens
Meter Department Uses Forms for All Controls

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Electrical World

FOUNDED IN 1874 • READ BY ELECTRICAL MEN FOR 73 YEARS

June 21, 1947 — Vol. 127, No. 25

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Cable Address McGRAW-HILL, New York

From a 1900 Code Book, an Okonite tape customer, Mr. R. J. McGinnis, tore out the advertisement shown (below at left) and sent it to us. Mr. McGinnis, of the Electric Service department of a large state university in the Midwest, wrote us that "the attached sheet will be of interest to your associates, especially the oldsters. It just goes to prove that a fine piece of quality merchandise lives on its merits and the service it delivers. Price is forgotten but quality remains for many years. Okonite and Manson Tapes have been on our shelves and in use on the campus for years. Needless to say, we expect to continue its use for a very good reason."

To this, we at Okonite have little to add other than showing a recent advertisement "Submerged for 13 Years and Still Good." We show this not so much for contrast as to give evidence that we are not taking leadership for granted but are making every effort to increase the service life expectancy of Okonite and Manson Tapes, which are described in Bulletin OK-1007, a copy of which is yours for the writing. The Okonite Company, Passaic, New Jersey.

AN OKONITE TAPE USER WROTE THIS ADVERTISEMENT!

OKONITE
TRADE MARK.

1889
PARIS EXPOSITION MEDAL
FOR RUBBER INSULATION.

1893
WORLD'S FAIR MEDAL
FOR RUBBER INSULATION.

THE STANDARD
FOR
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253 Broadway, N. Y.

And we still use it. Its a good product
Rym: Ginnis

SUBMERGED FOR 13 YEARS AND STILL GOOD!

...isn't this the kind of splice you'd like to make?

This photograph shows one of several splices protected with Okonite and Manson Tapes after removal from test following 13 years immersion in water.

The story of this long-time test explains the confidence placed by electrical men in Okonite and Manson Tapes especially for splicing and tapping underground cables installed in out locations – such as non-loaded rubber-insulated network cables and power feeders.

Each year all of these splices, made on 4/0 Okonite 600-volt network cable, withstood a test at 7000 volts a-c for five minutes. Insulation resistance readings were still in excess of 370,000 megohms when the splices were removed for examination. Such prolonged immersion had not affected the electrical strength.

Dissection showed that the Okonite splicing compound was securely bonded to the connector and conductors and had become vulcanized into a firm homogeneous seal that not one drop of water had penetrated. That's why so many experienced users say that for long, trouble-free service there's nothing like Okonite Rubber and Manson Friction Tape for splicing rubber-insulated cables.

We'd like to show you how easy it is to make joints like these. Just drop us a note on your company letterhead and ask for Bulletin OK-1007 and samples of these high-grade splicing tapes. The Okonite Company, Passaic, N. J.

SPECIFY OKONITE SINCE 1878 and MANSON TAPES

OKONITE OKONITE SINCE 1878 **and MANSON TAPES**

5207

Electrical World

JUNE 21, 1947

The Proprietor Is Responsible

No one, not even government, should enjoy privilege without bearing attendant responsibility.

When the federal government monopolizes the only economic and practical power sources in an area, preventing others from developing or helping develop these sources, it becomes a proprietor. As such, it must bear the responsibility for furnishing that area with a completely adequate and dependable power supply. This is no more than law demands of all regulated utility proprietors.

Electrical World always has opposed and continues to oppose governmental exercise of proprietary functions in power supply. We spurn the philosophy, abhor the accompanying deficit spending, and condemn the measurement of anything so vital by political yardsticks. We believe the government should quit the field forthwith, and that the country would benefit thereby.

However, as a result of 15 years of calculated encroachment, the federal government has become the dominant power proprietor in three areas—the Tennessee Valley, and the Columbia and lower Colorado River Basins. In the latter two—because it has, through investment, restrictive laws and the practicalities of finance, monopolized the only feasible power sources—the government is obligated to keep area power supply ahead of the demand for it. Currently, Congress threatens to cut Columbia and lower Colorado appropriations so much that the government will be unable to fulfill its obligations. There just isn't money enough in the House bill for the facilities which these two areas will require before private proprietors could possibly assume the responsibility, if they were permitted to do so.

Electrical World deplores this threatened action of Congress, but only because adequate, dependable power supply is more sacred than economy in government. Only where—and so long as—this principle applies does Electrical World endorse additional funds such as those in dispute for these two areas.

We recommend—as one way to resolve this dilemma—that Congress transfer to the Columbia and lower Colorado appropriations the funds it proposes to give California's Central Valley and the near Southwest. In each of these regions, the proprietary responsibility rests on private shoulders, and no federal money is required. The only use for such money is further duplication and uneconomic competition.

We know such a course is politically unrealistic; yet the facts of power supply in these two areas make the House-approved appropriations ridiculous. There is less to lose in being politically unrealistic than in being economically ridiculous.

Electrical World is not attacking economy in government. Let's have more of it. An excellent way to achieve it is to put the proprietary responsibility for power supply where it belongs—in private hands. But for so long as, and wherever, the government insists upon holding proprietary power privilege, we want no economy at the expense of the responsibility that proprietary privilege inescapably entails.

★ ★ NEWS OF THE

Support Develops for Moves to Amend Federal Power Act

Miller Bill Hearings Open Next Week—Rep. Byrnes Introduces Measure Banning Federal Jurisdiction Where States Approve Utility Accounting

NEW AND OLD Congressional moves to amend the Federal Power Act gained impetus this week as utility industry groups and state regulatory bodies rallied to their support.

Most important backing is developing in the industry, which plans to support actively both the Miller bills (ELECTRICAL WORLD, April 19, Page 14) and legislation recently introduced by Rep. John W. Byrnes, Wisconsin Republican. Officials of several utilities told ELECTRICAL WORLD they hope especially to obtain early amendment of the Power Act as protection against possible future power shortages. One asserted that: "If shortages develop in any area, the one immediate way of getting additional energy into the region affected would be through interconnections with neighboring systems. Of course, interconnections offer no cure-all, and, in some foreseeable cases, might afford no help at all."

Amendment of the Power Act as proposed in the Byrnes and Miller bills would exempt emergency interchanges of power from various phases of Federal Power Commission regulation and permit maintenance of permanent facilities for such interchanges, he added. The latter consideration seems the more important, since the emergency interconnections involving interstate exchanges of power allowed by FPC in the past under Section 202 of the act generally have been severed at the end of the emergency period.

Another industry representative pointed out that maintenance of permanent interconnecting facilities was desirable both on a strictly economic basis and as an asset to the national security. In the event of another war, he predicted, we might well find ourselves under attack and a large part of our power generating and distribution facilities bombed out before new interconnections could be erected and put into operation.

At least one major industry organization has conducted informal studies of the power supply situation, with a view toward further action if necessary. Apparently, the largest single area likely to be faced with a power shortage is in the midwest industrial section comprised of Indiana, Illinois, Wisconsin, Michigan, Ohio, western Pennsylvania and the region about St. Louis, Mo.

Largely dependent on steam-generating capacity, this area suffered steady decline of its generating reserves through inability to obtain new and replacement equipment. Though considerable new equipment is on order, manufacturers' deliveries are expected to be insufficient to insure the region's required reserve capacity until 1949.

Though many Midwestern systems have permanent interconnections, industry people contend that additional permanent, key interconnections should be established. For example, the wartime interconnection between Milwaukee and Chicago proved of inestimable value while operated on an emergency basis. This tie was severed immediately after the close of the war when FPC announced the termination of its Section 202 exemption of such facilities.

Meanwhile, the Commission, which has announced its opposition to the Miller bills and is expected to fight the Byrnes bill also, indicated that it was keeping close tabs on the nation's power supply. FPC Chairman Nelson Lee Smith hinted that his staff was expecting "several areas" to go through the coming winter with "very narrow margins" of reserves.

Asked if the Commission would act

ANOTHER HONOR FOR SULLIVAN—Rear Adm. John J. Manning, chief of the Bureau of Yards and Docks, presents to Dan A. Sullivan, Commonwealth Edison Co., a Navy Certificate of Merit at a ceremony at Washington. The award is another given Sullivan for his direction of the Utilities Wartime Aid Program

to permit temporary emergency interconnections in any area facing an actual power shortage, he asserted that FPC had no applications for any such tie-lines before now and would have to study any future request for them. However, he pointed out that the Commission recently gave swift approval to two requests for emergency interconnections, one in the Pacific Northwest and the other in the Gulf area.

One of the Miller bills, on which House hearings are scheduled to open Monday, permits energy interchanges on an emergency basis and slopover exchanges, without subjecting the companies to FPC regulation. The National Association of Railroads and Utilities Commissioners already has approved these bills, subject to modification to insure full state control where federal jurisdiction ends.

The Byrnes bill simply amends Sections 301 and 302 of the Power Act to exempt utilities, whose accounts conform to state regulatory rules, from changing their books to comply with FPC's Uniform System of Accounts, and to grant similar exemption for depreciation accounts of such utilities.

Rep. Byrnes said his bill developed out of complaints against "Dual Balance Sheet" practices enforced upon electric utilities subject to both Federal and state accounting regulations. The Wisconsin Public Service Commission, which has had several brushes with FPC over variances in their accounting regulations, is expected to support this measure. The bill also is believed applicable to such litigation as that which has dragged on between FPC and the Arkansas Power & Light Co. (ELECTRICAL WORLD, March 15, Page 88.)

Flood Washes Away Dividend

"Because of the necessity of conserving cash in view of the disastrous flood of June 3," Central Vermont Public Service Corp. has rescinded a dividend of 27 cents a common share, payable June 16, which was voted on May 6.

Long Compromise Fight Seen on Interior Appropriations

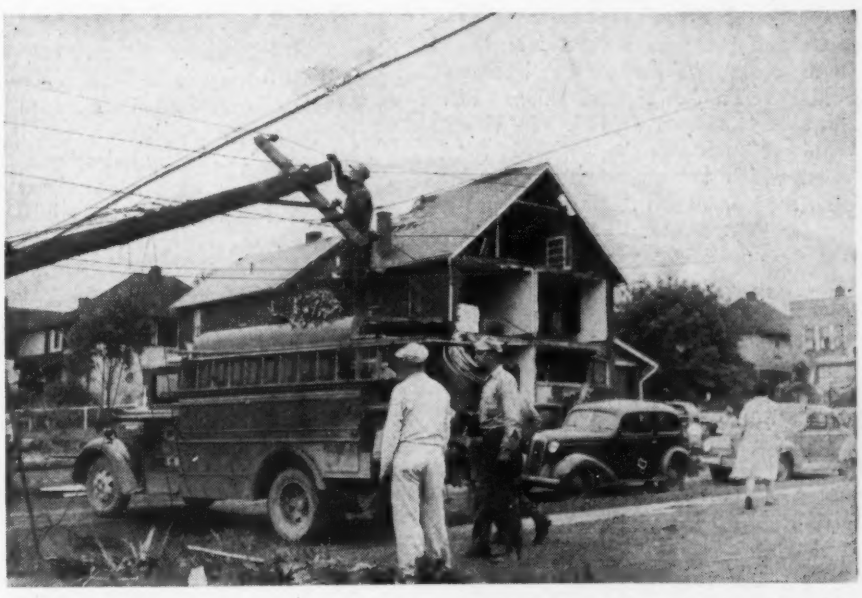
Senate Boost of $54,116,000, Largely for Reclamation Bureau's Power Program, Headed for Stiff House Resistance from Economy Leaders — Increases Seen Approved

A PROLONGED conference battle looms over the $215,530,000 Interior Department Appropriation bill passed Monday by the Senate.

Though there have been no lengthy conferences over money bills so far this session, House leaders predict privately that their conferees will hold out for most of the economies in the House version of the Interior bill, which totaled some $54,116,000 less than the Senate's version. However, the Senate consistently has succeeded in adding to House-approved figures; thus a compromise nearer the Senate figure is likely.

The Senate is believed to have strengthened the bargaining position of its conferees considerably by accepting the increases recommended by its Appropriations Committee with near-record speed and little or no debate. The Senate conference committee will be composed of the Appropriations committeemen who reported out the bill: Republican Senators Wherry, Gurney, Ball and Gordon, and Democrats Hayden, Thomas of Oklahoma and O'Mahoney. House conferees, also members of the Appropriations committee, include Reps. Jones of Ohio, Jensen, Fenton and Stockman, Republicans, and Kirwan, Norrell and Gore, Democrats.

Chief beneficiary of the Senate additions to the bill was the Reclamation Bureau, which received $104,730,532, as compared with the $67,892,600 in new funds allotted that agency by the House. Most of this $36,837,000 increase was earmarked by the Senate for major construction projects, in-



REPAIR WORK—Line crew of the Pennsylvania Power Co. restore service following recent tornado in the Sharon-Mercer area of Pennsylvania

cluding considerable boosts for hydroelectric generating and power transmission facilities in several states.

Bonneville Power Administration, voted only $6,907,800 in appropriations by the House, won a total of $16,222,400 in appropriations and $6,000,000 in contract authorizations.

One of the few reductions effected by the Senate was its slash in funds for the Southwestern Power Administration. The House approved a total SPA budget of $1,371,000 of which $1,246,000 was earmarked for construction of transmission lines, substations and appurtenant facilities. The Senate eliminated the entire construction fund, leaving SPA only $125,000 for administrative expenses.

The Senate gave the Division of Power a new lease on life by eliminating the House provision forbidding expenditure of any appropriations for that agency.

Report Includes Recommendation

At the insistence of Sen. Elmer Thomas, the Appropriations committee included in its report on the bill a recommendation for the establishment of a "national public power policy." This statement pointed out that several federal agencies seek budgetary funds for "the production and distribution of power" and that each of these agencies "has a different plan or system from the others."

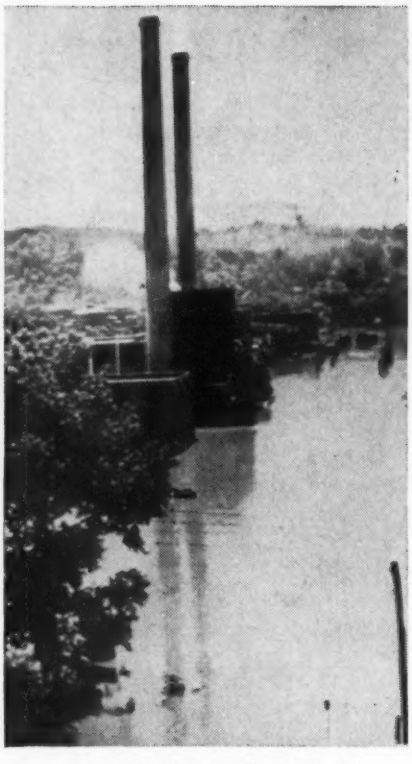
In justifying its huge boost in Reclamation Bureau funds, the Senate committee took issue with the House Appropriations group on the amount of funds available to the Bureau as a carry-over from previous appropriations. The House committee contended that the agency would have an unexpended balance of $85,826,767 at the start of fiscal 1948. Actually, the Senate committee held, the Bureau would have an unobligated balance of only $56,244,357 on July 1. In view of this $29,000,000 "error" of the House, which announced it was providing a $146,000,000 Reclamation program for 1948, the total additions made by the Senate amounted to only some $14,000,000 over the House program, the committee added.

Major Reclamation projects received increases as follows:

Project	House Bill	Senate Bill
Davis Dam	$6,200,000	$13,500,000(A)
Central Valley	6,900,000	10,016,288
Colorado-Big Thompson	6,815,000	10,471,908
Hungry Horse	1,550,000	3,285,353
Columbia Basin	11,435,000	20,354,000
Fort Peck	1,250,000	1,575,058
Missouri River Basin	9,786,600	18,535,000

(A) Plus contract authorizations of $4,500,000.

Included in the additions for construction at the Davis Dam project was an item of $60,000 for the "Wickenberg extension," a 230-kv. transmission line from the damsite to Prescott and Phoenix, Ariz. Funds also were provided for three additional transmission lines and two substations on the Central Valley Project which were not provided for by the House.



NO PLACE FOR STEAM PLANT— City-owned steam generating plant of Hannibal, Mo., was entirely surrounded by water during recent floods

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Electrical Engineers Elect Officers for Coming Year

Blake D. Hull, chief engineer, Southwestern Bell Telephone Co., St. Louis, has been elected president of the American Institute of Electrical Engineers, it was announced at the annual meeting of the Institute last week in Montreal.

Other officers elected were these vice-presidents: G. W. Bower, Public Service Electric & Gas Co., Newark, Middle Eastern District; J. H. Berry, Virginia Electric & Power Co., Norfolk, Southern District; I. M. Ellestad, Northwestern Bell Telephone Co., Omaha, North Central District; D. I. Cone, Pacific Telephone & Telegraph Co., San Francisco, Pacific District; and D. G. Geiger, Bell Telephone Co. of Canada, Toronto, Canada District.

Three directors elected were: W. L. Everitt, University of Illinois, Urbana; A. C. Monteith, Westinghouse Electric Corp., and E. B. Robertson, Plastics Manufacturing Co., Dallas.

Resumption of War-Time Interconnection Permitted

Finding an "acute shortage of generating and transmission equipment" in the power system of the Gulf States Utilities Co., the Federal Power Commission recently approved a resumption of the war-time interconnection between Gulf States and the generating facilities of the Gulf Oil Corp. at Port Arthur, Tex.

The interconnection order, which was sought by the oil firm, provides for interchange of energy up to 10,000 kva. in either direction under conditions of parallel operation. It permits use and maintenance of the interconnection until June 30, 1949, or until the end of the emergency on the Gulf States system, whichever is the earlier date.

The utility had made showing that: (1) its margin of reserve capacity diminished steadily during the war because new equipment was unavailable; (2) the heavy war demands on the system disrupted normal maintenance; (3) the continued shortage of equipment has made system expansion impossible on the scale necessary to meet the increasing load; (4) until the company's program of plant expansion can be carried out, it urgently needs the reserve capacity which will be available through the interconnection.

Gulf Oil has three generating plants in the Port Arthur area with a total nameplate capacity of 29,250 kw. These plants were integrated with the Gulf States system in 1944 on an emergency basis at the request of the War Production Board. The facilities required for the inter-tie—about 1,500 ft. of 33-kv. pole line, transformer, controls, metering equipment and switchgear—are in place, with the exception of one span of conductor removed in October, 1945.

Gulf States expects to complete installation of one new generating unit of 35,000-kw. capacity this month. It has on order another unit of 40,000-kw. capacity, to be installed in its Neches plant in May, 1949.

•

Plant Expansion Planned

Winnipeg Electric Co. has announced that it will spend an additional $2,306,711 at its Seven Sisters Falls power plant where it now has a $4,000,000 project under way. The additional development calls for the completion of the power house structure, the installation of the fourth 37,500-hp. unit, and the building of transmission lines and distribution facilities. When completed in 1949, the plant will have a capacity of 150,000 hp.

Heavy Atom Budget Snags Economy Program in House

Atomic Energy Commission's $500,000,000 Budget Yields No Permanent Savings Despite Temporary Cut—FPC, SEC Estimates Show Small Net Gains

THE HARD-BITTEN economy drive of the House Appropriations committee hit another snag last week as the committee reported out the $8,167,000,000 Indepenent Offices Appropriation bill for fiscal 1948.

Among the agencies provided for in this measure, none received more generous treament than the young Atomic Energy Commission. Though the committee pared $75,000,000 from AEC's request for direct appropriations totaling $250,000,000, it promised that the slash would be only temporary—until AEC and Congress secured "tangible facts on which to base a final recommendation as to total needs for the full fiscal year." In addition, AEC was authorized to assume contractual obligations to a total of $250,000,000—the full amount sought for this purpose in its budget.

The Federal Power and Securities and Exchange Commissions were each cut something more than 10 percent of their comparatively minuscule budget requests. But the $3,718,000 recommended for FPC amounted to an increase of $13,000 over its appropriated funds for the current fiscal year, while the $5,738,700 approved for SEC represented a $250,000 increase over appropriations given that agency for 1947.

With its new funds AEC will undertake the first great expansion of atomic energy facilities since the end of the war. Replacement of now obsolete equipment, expansion of bomb-making plants and erection of new laboratories, programmed in part since late 1945, has been delayed for nearly two years. Debate over the Atomic Energy Act, setting up AEC, and the subsequent delay in appointment and confirmation of members of the Commission, were the principal factors preventing earlier start of the atom program planned for the postwar period.

But this month AEC started placing contracts for an expansion program involving expenditures totaling nearly $350,000,000, a construction program of greater proportions than those undertaken by the federal government for any other purposes except highway and veterans' hospital work. Much of this expansion will be financed by funds taken over from the Manhattan District, with the remainder funded by appropriations and contract authorizations for the coming fiscal year.

The reduction in direct appropriations recommended by the House committee will not interfere with AEC's expansion plans. It is expected that the $75,000,000 will be restored in a supplemental appropriation early next year. According to the Committee's report, the cut simply reflected the House Body's dissatisfaction with AEC's inability, at the present, to provide "a reasonably comprehensive breakdown as to the distribution of funds requested." The committee emphasized that it had no intention "to retard development in connection with this most important project."

The bulk of AEC's construction program is aimed at providing improved and additional facilities for manufacture of bombs and fissionable material. This phase will cost about $215,000,000. As expected, no information has been divulged concerning the facilities to be built, except that it is known that $20,000,000 will be spent to convert the town of Oak Ridge from a temporary to a permanent basis. The scale of the program is suggested, however, by the fact that the whole Hanford plutonium plant —built with no precedents and under war conditions—cost only about $350,000,000.

It is indicated that the new production facilities will be located at existing atomic sites, principally Richland, Wash., and Oak Ridge, Tenn.

AEC will spend about $125,000,000 for construction of research facilities. Complete new laboratories, each costing approximately $20,000,000, will be built as follows: Brookhaven on Long Island; Argonne, Chicago; The Knolls, Schenectady; Miami, at Dayton, and on the West Coast, probably at Berkeley, Calif. A small laboratory is to be constructed at Iowa University, and specialized equipment will be installed at various universities.

Running of AEC's production program in the coming fiscal year will cost about $250,000,000, and research operations will require about $78,000,000. Most of this work is carried on by contracts with industrial firms or universities. Administrative expenditures of the commission—including something under 6,000 employees — will cost about $30,000,000.

In paring FPC's $3,905,000 budget request, the House committee allowed a $7,500 increase over the 1947 appropriation of $259,000 for the commission's flood control surveys, but reduced most other budgetary items. SEC was denied all funds requested in its $6,500,000 budget estimate for collection of corporation statistics. Other slashes included elimination of $22,748 requested for work in connection with the Administrative Procedure Act and of $6,636 requested for holding civil-service examinations.

SELLING AN IDEA TO BANKERS—Pennsylvania Power & Light Co. sponsored this meeting of bankers at Allentown to sell them the idea that financing of time payments for electrical appliances is profitable business. The utility will aid banks by supplying them with mailing pieces, handout material, and displays. Over 400 bankers attended this and a similar meeting held at Harrisburg

International Flavor Marks A.I.E.E. Meeting

Unmistakable continental and international atmosphere surrounded the convention of the American Institute of Electrical Engineers in Montreal June 9-13, 1947. Many papers were of Canadian origin and interest, and there were discussions of international standardization hinging on the new international Standardization Organization of the UN. Further, members of the Engineering Institute of Canada were guests and participants. In addition, the executive committee of CIGRE met to discuss organization's coming programs.

President Housley, at the annual meeting, said the A.I.E.E., with 27,000 members, is the largest engineering organization in the world. His newly announced successor, Blake D. Hull, said he hoped to see during his tenure the formation of some acceptable and effective American engineering association to take over some of the professional problems of engineers in general without encroachment on the prerogatives of the individual engineering societies.

In accepting the Lamme Medal, John B. MacNeill (Westinghouse) stressed the cooperative studies by utilities and manufacturers in advancing the art of circuit interruption, his own contributions being the basis of the award. He mentioned the 200,000 tests in the high-power laboratory, but said extrapolation would have to be relied upon if the 10,000,000 or 12,000,000 kva. of interrupting duty at 230 kv., now under consideration, are to cease being viewed as extremes. Ability to switch increasing concentrations of energy is indicated by the unrelenting load growth, he said.

The CIGRE meeting will be held at Paris next year and will have an international program of about 100 technical papers, of which the United States group will contribute some 15.

Registration at the convention approximated 1,900. Next year the A.I.E.E. will hold its annual summer meeting in Mexico City in June.

A report of the technical discussions at the Montreal meeting will be presented in the July 5 issue of ELECTRICAL WORLD.

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Sales Tax on Electricity

Electricity used for heating, lighting, and cooking is taxable at 1 percent under a retail sales tax effective July 1, Ralph A. Lehr, Erie County, N. Y., attorney has ruled.

All-Out Training Program Advised by S.E.E. Speaker

Recommendations that the utilities begin an all-out training program to meet the work needs for expansion of power facilities in the Southeastern Region were made by J. P. Flemming, industrial relations consultant, Ebasco Services, Inc., to the Personnel Administration Section of the Southeastern Electric Exchange, meeting June 6-7 at Virginia Beach.

Flemming pointed out that installing more generating capacity will not wholly meet the task ahead, for it will take trained men to operate the plants and construct the lines. He said that production can be increased only if employees are willing to produce.

Describing such practices as featherbedding, stretch-out of work, and slowdowns as means of maintaining employment, or the belief that high-speed production may lead to eventual lay-offs, he said that such thinking must be dispelled and production returned to normal.

To increase efficiency in operations and to promote good employee relations, he advocated a good, well-fitted training program and continuing it through refresher courses. Management, he added, must be more than just interested but must manifest such interest by insuring that policies are carried down the line through supervisors and foremen to employees on the production line. "Employees must be convinced, beyond all shadow of doubt, that it is to their advantage to perform a good day's work. They must learn to recognize the fact that voluntary full production is the best possible guarantee to steady employment and a 'full dinner pail.'"

Flemming suggested that employees must be taken into the confidence of management and informed of company aims and policies.

P.U.D. Puget Sound Purchase Ruled Illegal by Court

Proposed $135,000,000 purchase of Puget Sound Power & Light Co. properties by the Skagit County P.U.D. of Mount Vernon, Wash., acting for a group of public utility districts, was declared illegal in a 5 to 4 decision handed down June 16 by the Washington State Supreme Court after bitter dissension among the justices.

The justices divided principally on whether it was the intention of the people acting through the legislature to permit P.U.D.'s to purchase property outside their respective districts. The majority held that such power was not intended; that the legislative provision for P.U.D.'s to purchase property "within and without" their respective districts applied only to purchase of property incidental to providing the inhabitants of public utility districts with public power service and not to authorize the purchase of a far-flung system.

The proposed sale also was held illegal under a provision of the state constitution that "no . . . municipal corporation shall hereafter . . . become directly or indirectly the owner of any stock in or bonds of any association, company or corporation."

Under the proposed plan the stockholders of Puget Sound Power & Light Co. would trade in their stock at $18 a share and the Skagit P.U.D. as the issuer of $135,000,000 in bonds would be the owner of the stock.

While the Skagit P.U.D. and its representatives emphasized that all the electric properties of Puget Sound must be acquired because it is an integrated system, they also testified that the purpose of the purchase was to redistribute the system to each individual district in the territory served by Puget Sound Power & Light, the majority opinion stated, raising a point of inconsistency in the Skagit P.U.D. position.

"To carry the respondents' argument to its logical conclusion," the majority opinion continued, "means that the Skagit P.U.D. could acquire not only the properties of Puget Sound but it could acquire those of the Washington Water Power Co. and the Pacific Power & Light Co. serving eastern Washington."

Simultaneously with the release of the majority and dissenting opinions, Chief Justice Joseph A. Mallery and four other justices issued a statement severely criticising Justice William J. Millard for the latter's alleged eleventh hour reversal of opinion and asserted dilatory tactics in his final affirmation of the majority opinion. Justice Millard in turn asserted that the chief justice was acting politically and was violating long standing court procedure in revealing the inner workings of the court and tentative opinions of its judges.

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On Connecticut P.U.C.

Henry B. Strong has succeeded Joseph P. O'Connell, and Carl M. Sharpe has succeeded Clyde Olin Fisher on the Connecticut Public Utilities Commission.

New Clark Hill Bill Permits Utility to Share in Project

A bill to enable a private utility to share in development of the government's multiple-purpose Clark Hill project—possibly the first in a series of such measures—has been introduced in the House of Representatives.

The bill, presented last week by Rep. George A. Dondero, directs the Federal Power Commission to license the Savannah River Electric Co. to "construct, own, operate and maintain" the Clark Hill power plant. The Army Engineers, scheduled to construct the entire development under the Flood Control Act of 1944, would retain responsibility for the dam and all its non-power elements.

If enacted, the Dondero Bill might resolve controversies which have arisen over Army Hydroelectric projects elsewhere. A subsidiary of Arkansas Power & Light Co. has applied to FPC for a power plant license at the Army's Bull Shoals dam on Arkansas' White River. This and the Clark Hill bid have been followed closely by many electric utilities.

House Prospects Favorable

House prospects for the Dondero Bill are excellent, according to its sponsor. The Michigan Republican, chairman of the Public Works Committee, will start subcommittee hearings June 23. Concurrently, this group will consider a bill introduced by Rep. Earl Wilson, Indiana Republican, forbidding further expenditures at Clark Hill and giving it to Savannah River Electric for completion.

Considerable opposition to continued federal construction of Clark Hill developed, both in the area and in Congress, after the utility applied last summer for a license. FPC rejected the application on the grounds that it could not circumvent the will of Congress as implied by the act authorizing the project.

For the past several weeks, however, representatives of the utility and Army Engineers have been conferring in an effort to work out a possible "compromise." Rep. Dondero told an ELECTRICAL WORLD representative that his bill resulted from these conferences.

On this basis, the Engineers are not expected to oppose the measure—unless the proposed compromise runs counter to the power policy of the Truman administration. No hint as to White House feeling on the bill was immediately available.

The Dondero bill directs Savannah River Electric to erect and operate the power house at Clark Hill "in accordance with plans approved by the Chief of Engineers" and the War Department. Any license would be subject to all applicable provisions of the Federal Power Act, and FPC would fix the charges to be paid to the government. It would seek complete power repayments within 50 years. The commission also would set the rates at which the company would sell energy "at the switchboard."

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New Nebraska Legislation Affects Electric Systems

The Nebraska Legislature which adjourned this month passed the following legislation of interest to electric utilities:

Owners of properly constructed power lines shall not be liable for inductive interference caused in one-wire ground return telephone lines.

The sale, lease, or transfer of any power plant, distribution system or transmission line shall be authorized at a state or municipal election, including primary or special elections.

Payments by public power districts in lieu of taxes should be distributed in the same proportion as taxes.

Cities or villages that buy electric distribution systems from power districts shall make the same payments in lieu of taxes as were made by the district.

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Cheap Power for Co-ops

Duke Power Co. has been granted authority by the North Carolina Utilities Commission to establish a special rate of 7.5 mills per kw.-hr. for power sold to the 15 cooperatives that it supplies in North Carolina.

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Winsett Quits REA

B. B. Winsett, assistant chief of the Rural Electrification Administrations Engineering Division, has resigned to enter private business. After serving as a construction engineer with the Tennessee Valley Authority, he joined REA in July, 1940, as a regional engineer. He plans to open his own engineering and contracting office in Memphis early this summer.

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Sawyer Reelected

Willard C. Sawyer, president of the John G. Virden Co., Cleveland, was reelected president of the American Home Lighting Institute at its recent meeting in Atlantic City. Robert H. Bishop, vice-president of Sylvania Electric Products, Inc., was elected to the board of governors.

Ark-La Operational Plan Filed with State Board

Approval of the purchase and operating plan for properties of Ark-La Electric Cooperative, Inc., has been asked in three applications filed with the state Public Service Commission.

Arklahoma Corporation, incorporated to serve as operating company for the power transmission line, asked commission approval of:

The organizational plan of Arklahoma Corporation.

Purchase of the transmission line from Ark-La at a cost of $2,533,333.

Issue and sale of $50,000 par value common stock and $2,525,000 in principal amount first mortgage bonds to finance the purchase.

Segregation of the two Ark-La substations at Markham's Ferry, Okla., and Lake Catherine from the rest of the property. Title to the substations would be taken by Southwestern Gas & Electric Co. for $1,266,666.

If the application is approved, Arkansas Power & Light Co. and Oklahoma Gas & Electric Co. will transfer their contractural rights to purchase the transmission line to Arklahoma and the entire cooperative property will be operated for the equal benefit of the three companies.

In another application Arklahoma asked permission to lease the transmission line to Arkansas Power & Light and Oklahoma Gas & Electric on a 30-year contract. Chief benefit of the line to the two companies would be the exchange of power and mutual assistance in emergencies, the application stated, and its acquistion would supplement the service of Arkansas Power & Light between Little Rock and the Arkansas River.

Final application submitted for commission approval was that of Southwestern Gas & Electric Co. for authorization to purchase the two substations.

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Manitoba Utility Sold

The Manitoba Power Commission has acquired the franchise of the Winnipeg, Selkirk & Lake Winnipeg Railway, a subsidiary of the Winnipeg Electric Co. The purchase price has not been disclosed.

The private company retained its electric utility franchise in Stony Mountain, Stonewall, and the intervening rural area after it surrendered its transportation franchise in 1937. As soon as the purchase has been confirmed by order-in-council, the commission will start supplying electric service.

TOO MUCH WATER—Hydro plant, left, of the City of Ottumwa, Iowa, closed down when flood waters of the Des Moines River rose to flood stage

N. England Resents FPC Excesses, Miller Asserts

"Widespread resentment" in New England against the Federal Power Commission for "exceeding its authority under the Federal Power Act" was described by Rep. William J. Miller, Connecticut Republican, during a special radio broadcast on June 14.

FPC Chairman Nelson Lee Smith and Rep. Aime J. Forand, Rhode Island Democrat, both of whom defended the activities of the commission, also participated in the program, which was heard only in the New England states. A representative of the Connecticut Light & Power Co., who was invited by Rep. Miller to take part in the discussion, was unable to attend.

In the course of the debate Chairman Smith revealed that FPC would oppose both bills introduced by Rep. Miller to amend the Federal Power Act, (ELECTRICAL WORLD, April 19, page 14). The Miller bills, he asserted, "amount not simply to clarifications of the Congressional intent, as expressed by the Federal Power Act, but in reality would involve substantial alterations of national policy which would be against the public interest."

Rep. Miller pointed out that his bills developed as the "outgrowth of numerous requests by private citizens," who complained of FPC's activities in New England. He held that the principal objectives of his bills were: (1) to prevent FPC regulation of manufacturing plants which generate hydroelectric energy for their own use and do not engage in "sales of energy in interstate commerce;" (2) to clarify the Power Act definition of "navigable streams" to restrict its application to those waters "which really are navigable."

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Editor Wins Award

Mary Singleton, editor of Georgia Power Co.'s employee newspaper "Snapshots" won first award in the industrial publications contest of the International Council of Industrial Editors. The 1947 award was presented at a luncheon of the Southeastern Industrial Editor's Association in Atlanta.

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110-Kv. Line Sold

Wisconsin Public Service Corp. has been given permission by the Wisconsin Public Service Commission to sell a 110-kv. transmission line between Wausau and Chippewa Falls to Northern States Power Co. for $215,000. The line is approximately 80 miles long.

MEETINGS

Previously Listed

American Institute of Electrical Engineers—Pacific General Meeting, San Diego Hotel, San Diego, Calif., Aug. 26-29.

SEC RULINGS

The Securities and Exchange Commission recently issued a series of orders affecting electric utility companies.

SOUTH CAROLINA POWER CO. has been granted permission to issue and sell at competitive bidding 200,000 shares of no-par value common stock and $4,000,000 principal amount of first and refunding mortgage bonds due 1977. Proceeds will be used to finance construction of property additions, to repay a temporary loan of $500,000 owed to its parent, Commonwealth & Southern Corp., and for other corporate purposes. In approving the application, the commission stated that its order of Jan. 11, 1945, restricting dividend payments on South Carolina's common stock so long as any bonds issued under that order and due in 1975 remain outstanding, shall also be applicable while any of the new bonds coming due in 1977 shall remain outstanding. The order of approval also was conditioned upon Commonwealth agreeing to dispose of its interest in South Carolina. (Release No. 7393).

VIRGINIA ELECTRIC & POWER CO.'s request that it be qualified as a bidder for 60,000 shares of $10 par value common stock and $1,300,000 principal amount of first mortgage bonds, Series A, due 1977, all of the securities of East Coast Electric Co., a subsidiary of East Coast Public Service Co., has been granted. Virginia Electric stated that if it does acquire these securities it subsequently will acquire all of the properties of East Coast Electric, eliminate its outstanding securities and dissolve that company. Jurisdiction was reserved by the commission over all fees and expenses and over the proposed acquisition by Virginia of the electric utility assets of East Coast Electric and the dissolution of that company. (Release No. 7413).

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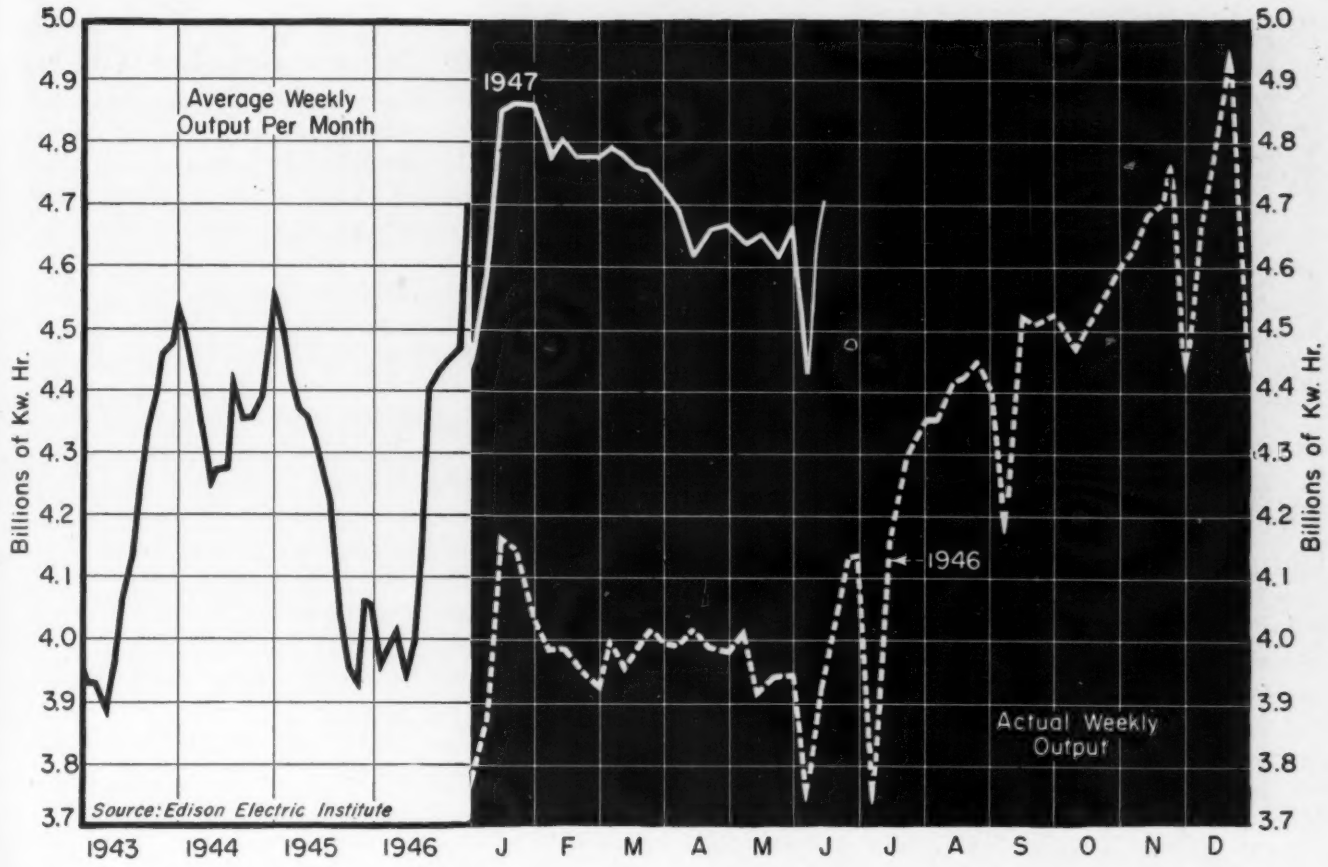
E.E.I. Elects Directors

Edison Electric Institute has elected to its board of directors, for terms ending 1950, the following presidents of utilities:

Ernest B. Acker, Central Hudson Gas & Electric Co.; Austin D. Barney, Hartford Electric Light Co.; E. F. Barrett, Long Island Lighting Co.; Rex I. Brown Mississippi Power & Light Co.; Hance H. Cleland, San Diego Gas & Electric Co.; J. A. Longley, Central Illinois Light Co.; L. A. Magraw, Central Illinois Public Service Co.; H. B. Munsell, Kansas City Power & Light Co.; Roy S. Nelson, Gulf States Utilities Co.; C. E. Oakes Pennsylvania Power & Light Co.; B. F. Pickard, Interstate Power Co.; McGregor Smith, Florida Power & Light Co.; A. C. Spurr, Monongahela Power Co.; C. J. Strike, Idaho Power Co.; O. Titus, Metropolitan Edison Co.; P. H. McCance, Duquesne Light Co.



FPC Orders Bagnell Dam Operated to Limit Floods

For the first time in its history, the Federal Power Commission last week ordered that a licensed hydroelectric project be operated to control floods as well as to generate energy.

The order directed the Union Electric Co. of Missouri to maintain reservoir levels and control the discharge of flood water at its Bagnell dam on the Osage River in such manner as to afford maximum protection to lands below the dam site.

Nearly two years of proceedings by the commission, climaxed by a public hearing at Jefferson City last January, preceded this action. FPC instituted an investigation after receiving complaints from land-owners below the project that the operation of the dam since its completion in 1931 had frequently flooded their property. Several of the complainants also filed damage suits against Union Electric.

According to the FPC order, joint studies by the commission's staff and the company found that during 19 floods occurring between 1932 and 1944 the operation of the dam increased the flood stage below the project five times, had no effect during two floods, and decreased the maximum stage below natural levels in twelve floods.

The flood control procedures ordered by FPC require the company to adjust the discharge rate at the dam at short intervals whenever the natural flow exceeds 50,000 cu. ft. per second, to release flood waters at the rate of the natural increase in rise of the stream, and to maintain the reservoir at maximum normal levels of 657 ft. in wet seasons and 660 ft. in dry seasons.

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Saskatchewan Cuts Rates

A general reduction in electric rates which will cost the Saskatchewan Power Commission a $150,000 annual decrease in revenue has been announced by Natural Resources Minister J. L. Phelps.

Effective July 1 in 237 towns, maximum rate for electricity will be reduced from 10 to 9 cents per kw.-hr. In 14 larger towns, the reduction will be from 9 to 8 cents per kw.-hr.

The commission has been reducing its maximum rate rapidly. In 1945, it was reduced from 15 to 12 cents per kw.-hr. In 1946, it was reduced to 10 cents.

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Publicizing Mississippi

Mississippi Power & Light Co. is distributing a 22-page booklet, "Deal Me In," which gives statistics claiming that "Mississippi is the South's fastest growing market."

Output Moves Upward

The electric output curved moved upward again during the week ended June 14, 1947, according to figures released by the Edison Electric Institute. The amount of electric energy distributed by the light and power companies of the country amounted to 4,701,992,000 kw.-hr., comparing with 4,635,218,000 kw.-hr. during the preceding week. Last year the total was 4,030,058,000 kw.-hr., this year's figure representing an over-all increase for the country of 16.7 percent. The largest individual increase was shown by the Southern States, which reported a gain of 24.2 percent.

Weekly Output, Millions Kw.-Hr.

1947		1946		1945	
June 14	4,702	June 15	4,030	June 16	4,348
June 7	4,635	June 8	3,920	June 9	4,327
May 31	4,429	June 1	3,741	June 2	4,204
May 24	4,663	May 25	3,942	May 26	4,330
May 17	4,616	May 18	3,939	May 19	4,377
May 10	4,653	May 11	3,911	May 12	4,302
May 3	4,640	May 4	4,012	May 5	4,397
Apr. 26	4,668	Apr. 27	3,977	Apr. 28	4,416
Apr. 19	4,660	Apr. 20	3,987	Apr. 21	4,411
Apr. 12	4,620	Apr. 13	4,015	Apr. 14	4,332
Apr. 5	4,693	Apr. 6	3,988	Apr. 7	4,322
Mar. 29	4,729	Mar. 30	3,992	Mar. 31	4,329
Mar. 22	4,759	Mar. 23	4,017	Mar. 24	4,402

Percent Change from Previous Year

	June 14	June 7	May 31
New England	+ 7.3	+ 6.7	+ 4.2
Mid-Atlantic	+10.3	+ 9.9	+ 9.5
Central Industrial	+16.4	+20.1	+21.0
West Central	+12.8	+13.6	+21.3
Southern States	+24.2	+24.4	+23.8
Rocky Mountain	+17.8	+15.7	*+16.7
Pacific Coast	+18.5	+19.8	+23.8
Total United States.	+16.7	+18.2	+18.4

*Revised.

Electrical World
OPINION

TVA Repayment Program

IN reporting the Government Corporations Appropriations bill recently, the House Appropriations Committee included therein a 40-year repayment plan designed to return to the Treasury all funds invested in TVA's power plant accounts. The move is a good first step, although it is hardly so impressive as it might seem. After all, TVA has made two payments of net revenue into the Treasury and stood to make more during forthcoming years, all of them repayments on power investment.

What the committee should have done, and quite possibly will do within a very few years, is to require TVA to rearrange its accounts so as to charge full interest before calculating net earnings. This won't add a dollar to the Treasury's receipts, to be sure, for the funds which remain after expenses won't be raised or lowered a bit by being credited to either or both of two accounts. Still, it will serve to make TVA's financial statements a good deal more realistic. If 2.5 percent interest—the government's average on long-term borrowings—on an investment of several hundred millions be deducted from what is now reported as net income, there will be considerable difference in the size of the net. There will also be a considerably more realistic balance sheet. It will still be a far cry from the balance sheet which 80 percent of the industry, capacity-wise, has to turn in.

"Judgment Day A'Comin'"

ELECTRIC utilities should heed the advice of the old spiritual:

"Better be ready,
You better be ready,
Ready for the Judgment Day."

We foresee no apocalyptic Judgment Day immediately ahead for them; but there is a lower-case judgment day ahead. It will arrive when customers decide whether utilities are fulfilling the job they have assumed—to insure that modern lighting be properly specified and installed.

It makes no difference if a power company has or has not enlisted in the Planned Lighting Program recently announced by the Edison Electric Institute and the Better Light-Better Sight Bureau. From now on, every utility will face increasing customer demand for help in solving lighting problems. This demand will come directly from customers, and by way of contractors, dealers, architects and engineers. From whatever direction it comes, the demand will be insistent.

Under the Planned Lighting Program, lamp manufacturers intend to leave to utilities the responsibility for correctly planned lighting. One equipment maker already has embarked on an advertising program advising prospective buyers to go to the local utility for engineering advice and help. One maker of cold-cathode is contemplating similar promotion. As the Planned Lighting Program gains momentum, more and more makers of lighting sources and equipment will point to the utility as the source of all wisdom in lighting design and of willing help toward better lighting.

Then the utility had "better be ready;" ready with competent lighting specialists, ready with enough of them—because it will be a most unhappy judgment day for any power company that can't respond competently. To all utilities, including the many that now have well-organized lighting departments, we suggest self-examination on these questions: Have we really competent illuminating engineers? Have we enough of them?

Putting Hobbles on the Infant

SOMETIMES, says common rumor, combination utilities give a break to gas at the expense of electric service. Maybe it is in the allocation of general costs or perhaps by a tempering of aggressiveness in building electric load. Or it may be in rates, which was the reason for the recent changes in schedules of the Norwich, Conn., municipal utility reported elsewhere in this number.

For its action toward making gas service pay full fare, we applaud the Norwich rate revision. But we look on another provision in it with a most dubious eye.

This is the "video" rider on the residential electric rate, a surcharge for a television installation. Wholly aside from any consideration of the merit of the rider (that point is discussed at length in an editorial in the July issue of the magazine *Electronics*) we question the wisdom of imposing it at the present time.

Television is now hardly more than well started on the long road toward general public acceptance. How far and how fast it will go on that road, no one knows. There is yet no significant record of experience, no convincing accumulation of data, to show what will be the effect of television on the loads carried by electricity supply systems. Theoretical projection of such effect, no matter how valid it is in arithmetic, seems insufficient to justify such a drastic move as is included in the new Norwich rates. Fear of where his steps may take him is not a good reason for hobbling the infant before he begins to walk.

Maine Still Won't Export

MAINE'S policy against the export of hydroelectric energy, a third of a century old, still stands. The legislature, supported by the Central Maine Power Co., has rejected repeal proposals sponsored by a Boston newspaper which sought more hydro energy from New England's rivers—and more funds from the nation's treasury.

Some years ago, Central Maine supported a proposal permitting the export of surplus energy, under recapture provisions aimed at making the state's natural resource of hydroelectric power available to consumers which might locate there. Whether the company would take such a position today is problematical. As President Skelton points out, federal jurisdiction over power companies is a very different matter today, vastly broader and infinitely more easily asserted. In those days, the Attleboro case governed, or failed to. Today, the Jersey Central and Hartford decisions apply. It is a rare power company which will invite federal regulation without more to be gained than is apparent to management in Maine.

On this basis, Maine's continued refusal to export is less selfish than it might be considered at first glance. The same applies elsewhere in the United States, where utility systems have foregone the benefits of integration in preference to accepting federal regulation. Let the Boston paper which seeks Maine waterpower—and federal funds—seek also a federal policy which permits interstate integration without the penalties of federal regulation. Let it support the bills introduced recently by a New England Congressman to redefine federal jurisdiction in these matters. Let it support the legislation which the National Association of Railroad and Utilities Commissioners has submitted on this point, presumably with the approval of its New England members. Then let it criticize Maine for its no-export policy.

Public Service Comes First

ONE outstanding feature of the recent E.E.I. convention was the presentation of the Matthews Valor Award. It went to a 13-man line crew of the Public Service Co. of Colorado. At great risk, and under extreme hardship, these men ventured into a blizzard and remained marooned for eight days high in a Rocky Mountain pass while they repaired a 100-kv. line which was an integral part of the company's system. Their courage and their faithfulness to the concept of public service is hardly rare in the electric power industry, but it is nonetheless inspiring and deserving of recognition. It was particularly fitting that they should be honored at a convention which paid such attention to public relations.

What is regrettable is that these men could not be honored in person at the convention. Still held in the ideal of service, they had to stay on their jobs.

WASHINGTON COMMENT

By R. N. LARKIN

IT'S about time to begin plugging the ears with cotton. If Washington State's recent by-election, wherein Republican Russell Mack defeated Democrat Charles Savage for a Congressional vacancy, is at all indicative, the 1948 campaign will be worse than any ten singing commercials.

Watching, from 3,000 miles away, an election which is intrinsically dramatic—and which could have been awfully meaningful to the public versus private ownership controversy—can be as confusing as it can be fascinating. What was the issue in Washington's Third District? The record shows that there are many who will be glad to tell you. It won't support the assertions of anyone.

The Associated Press, for instance, covered it purely as a battle between the Henry Wallace-Harry Truman concept of U. S. foreign policy. Wallace, who spoke twice in Savage's behalf, says, "Foreign affairs was not the issue." Marquis Childs leans to the foreign affairs theory—certainly he does not find that power and reclamation was the burning question. The *Seattle Star*, editorializing upon the primary election results, believes that the "slaughtering of Western reclamation appropriations . . . was the most important factor." The *Portland Oregonian*, also discussing the primary, asserted that "close observers . . . found no particular concern over the power supply or its cost." This statement followed an assertion that Democrats would pin the decision on G.O.P. cuts in the Interior bill. Richard L. Neuberger, Boswell of the Pacific Northwest, announced before the election that Savage's issue would be power and reclamation.

Whatever decided the matter, the result was a beating for the spenders in either camp. Mack is no private ownership man, nor is he one to halt the golden flow into the Northwest. It was, thus, no private power victory in the sense of gaining an anti-public power vote.

Where the spenders got licked, then, was in the fact that they failed to elect their avowed New Deal candidate. They failed to regain one of the G.O.P. seats they lost in last fall's Republican—and economy—landslide. They lost a stunning chance to frighten the House economy leaders with the threat of political defeat. This is the plainest language that can be talked to a Congressman. It is also the heart and soul of the spenders' case against the House version of the Interior Appropriations bill. They had their chance. On whatever issue, they lost it. Thus, the G.O.P. House, which was sent to Washington with an economy mandate, has pretty good reason to consider that its economy mandate still holds.

Apart from power, the Wallace performance was amazing. Wallace stole the show from both major parties, confusing what should have been a test of the difference between them—more federal government or less.

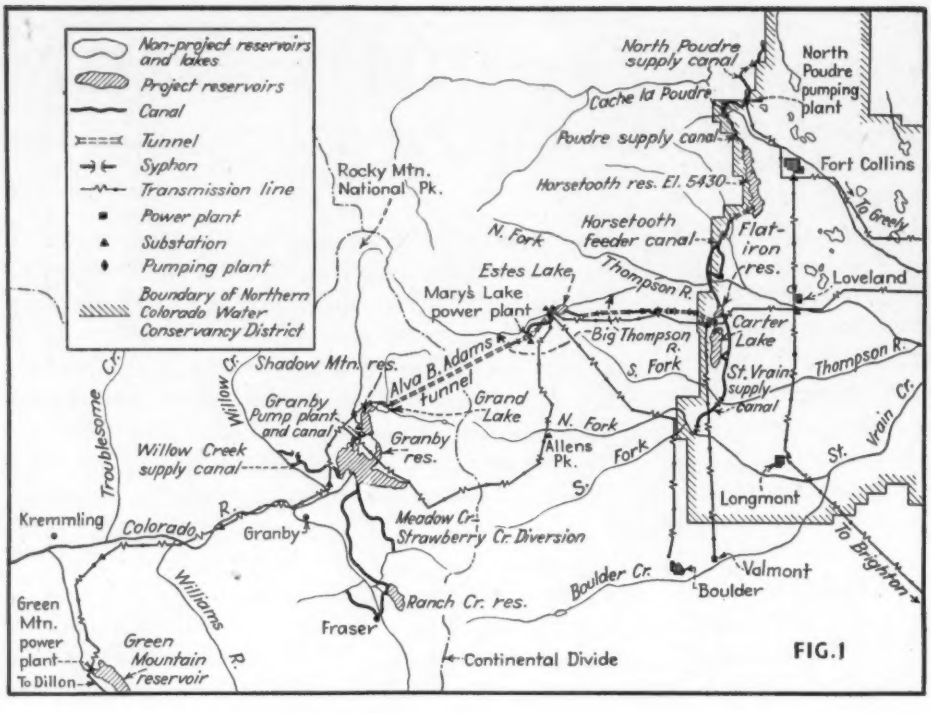
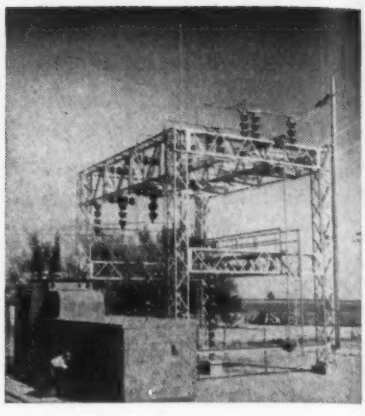


FIG. 1



PROSPECT VALLEY, completed in 1945, typical of 5,000-kva., 115-kv., unit substations for irrigation pumping on Colorado-Big Thompson Transmountain Diversion Project

GENERAL LAYOUT, Colorado-Big Thompson Project

Construction Features of

R. M. SENSINTAFFAR
U. S. Bureau of Reclamation, Denver, Colo.

TRANSPORTING Colorado River water from the western to the eastern side of the Continental Divide via a 13-mile tunnel for irrigation and development of 175,000 kw. of power has imaginative appeal as well as many interesting engineering features. This U. S. Bureau of Reclamation project was undertaken in order that the state of Colorado might realize the benefits of its allocation of waters of the Colorado. Only the eastern part of the state can use the water for irrigation.

The ambitious proposal of tunneling the Continental Divide, known as the Colorado-Big Thompson Transmountain Diversion Project, was started in 1937 and has now progressed well toward its goal of completion in 1953. A four-year wartime curtailment and the more recent Steelman Order restricting USBR construction have been partially rescinded to increase funds for the Reclamation program, including this project, to $110,000,000 for 1947.

The project contains a number of features on the western continental slope for impounding and collecting a water supply from the Colorado and Blue Rivers. This water will be diverted through a 13-mile tunnel to the eastern slope, where a number of hydroelectric power plants and irrigation storage reservoirs are located. The diversion tunnel, known as the Alva B. Adams Tunnel, has a capacity of 550 sec.-ft. The flow time of water through the tunnel is about 2.2 hr. Begun in 1940, the tunnel was completed in 1946. Twice during the war period work stopped due to material and labor restrictions. Geographical location of the project and the 1946 plan are shown in Fig. 1. Fig. 2 shows a profile of the project.

Western Slope Features

On the western slope, the Shadow Mountain reservoir, Granby reservoir and pumping plant, and Green Mountain reservoir and power plant are the principal features. Colorado River water will be stored in Granby reservoir and elevated by Granby pumping plant into Shadow Mountain reservoir from which it will flow by gravity into Grand Lake and then into Adams tunnel. Lift from Granby reservoir to Shadow Mountain will vary from 89 ft. to 183 ft., depending upon the water storage in Granby reservoir.

During part of the run-off season no pumping will be required as natural flow into the reservoir will exceed diversion requirements. The Shadow Mountain reservoir, completed in 1946, and Grand Lake will have the same water surface elevation and a combined area of 1,865 acres. One foot of fluctuation in elevation of water surface of these two bodies will provide sufficient storage so that pumping from Granby to Shadow Mountain can be done during off-peak hours of electric power demand.

The pumping plant will consist of three units, each having a capacity of 200 sec.-ft. at a 186-ft. head, driven by a 6,000-hp. synchronous motor. The Green Mountain Dam and power plant is located on the Blue River, approximately 20 miles south of Kremmling, Colo. It was completed in 1943. Output of the plant is fed into the system of the Public Service Co. of Colorado for distribution.

The Green Mountain plant has two 10,800-kw. units with an active storage reservoir of 147,000 acre-ft. This reservoir was constructed to insure supplementary water for western slope interests, since, under adverse water conditions on the Colorado River

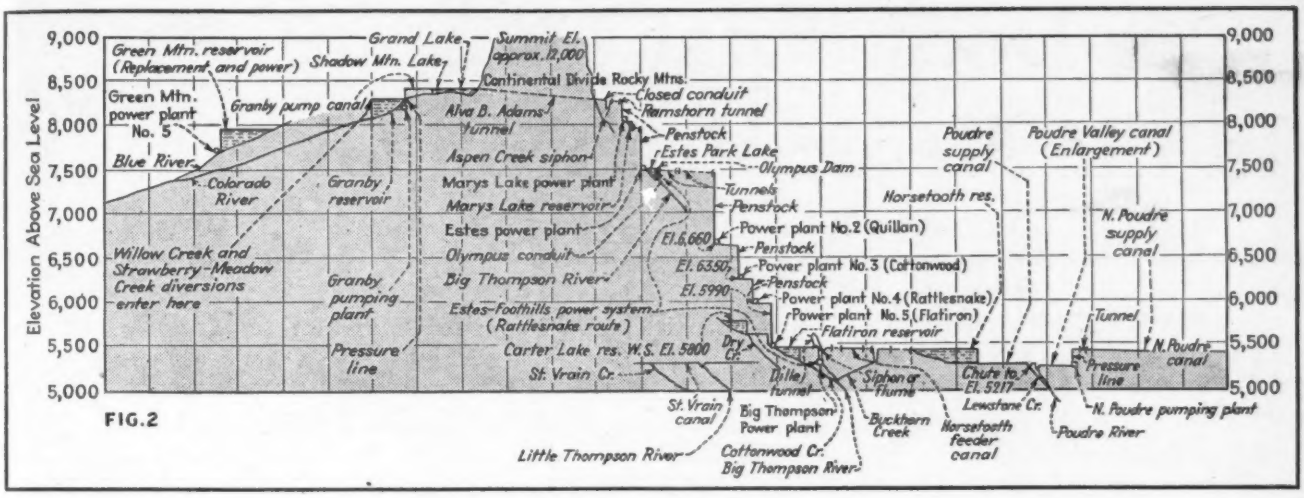


FIG. 2

Reclamation project spans Continental Divide to provide irrigation and power from waters of the Colorado River

Colorado-Big Thompson Project

when water is diverted from Granby reservoir, insufficient water is available for downstream requirements. Granby Dam, now under construction, is scheduled to be virtually complete in the fall of 1949 to permit storing 1950 spring run-off.

Eastern Slope Features

The eastern slope features consist principally of an aqueduct from the east portal connecting Marys Lake, Estes, and five foothill power plants with Carter Lake reservoir and Horsetooth reservoir. The water, in leaving the east portal of the Adams tunnel, will flow through the Aspen Creek siphon, Ramshorn tunnel, and Marys Lake power plant. Discharge from Marys Lake power plant will be stored daily in Marys Lake and then carried through Prospect Mountain tunnel into penstocks for the Estes power plant. The Marys Lake plant will consist of one 8,100-kw. unit and the Estes power plant will have three 15,000-kw. units.

Estes and Green Mountain plants will furnish most of the peaking power for the electrical production system. Marys Lake will have a storage capacity of about 769 acre-ft., sufficient to supply water for operation of the Estes plant. After discharge into Estes Lake the water will be diverted into an aqueduct supplying the foothills' power units, which will operate essentially as base load plants. Between the east portal of Adams tunnel and the lowest power plant in the system there is approximately 2,800 ft. of head, practically all of which will be utilized for hydroelectric power development.

From this lowest power plant, water will be diverted into Carter Lake and Horsetooth reservoirs, having a combined active storage capacity of 247,400 acre-ft. From these reservoirs, water will be delivered to the Northern Colorado Water Conservancy District, which will distribute irrigation water through a gravity system to its members located in northeastern Colorado.

On the eastern slope the Ramshorn and Prospect Mountain tunnels and Horsetooth reservoir are now under construction. Specifications for Estes and Marys Lake power plants and that part of the aqueduct connecting them, but not now under construction, have been issued so that contracts may be awarded and they can be completed in 1949. A partial power supply can probably be developed in the fall of 1949. The foothills' plants are scheduled for construction beginning in 1951 to be completed by 1953.

The eight power plants will have a total installed capacity of about 175,000 kw. and will produce about 130,000 kw. of firm power and 25,000 kw. of secondary power. They can deliver annually about 600,000,000 kw.-hr. of firm energy and 165,000,000 kw.-hr. of secondary energy to a network of 34.5-, 69- and 115-kv. transmission lines. The 115-kv. lines will be shielded by two overhead ground wires and each section will eventually be provided with 20-cycle fast reclosing breakers. The energy will be delivered to cooperatives, municipalities and utilities in northeastern Colorado. Under the Reclamation Act of 1939, preference in the sale of the energy must be given to cooperatives and municipalities.

Considerable electrical energy will be used for irrigation pumping along the South Platte River in addition to the gravity irrigation of the district.

The project is being constructed by funds provided by the Congress. Costs will be repaid jointly by the Northern Colorado Water Conservancy District and by revenue from the sale of power.

Who Does What In the Meter Department

Responsibilities and procedures of a meter department serving diversified loads in urban areas with routines in use for coordinating field and office work

ADMINISTRATIVE responsibilities in central-station meter departments are highly diversified and call for systematic handling in order that field and shop work can proceed with dispatch and clarity, relations with sales and operating forces can be kept direct and definite as to work and functions of personnel, and records maintained for maximum accessibility and accuracy. Principals are the same for wide variations in company size. Here are the essentials of meter department superintendence as practised by an eastern utility serving between 50,000 and 75,000 meters.

The department head is charged with proper installation, removal, maintenance, repair, operation, testing and reading of all meters, including instrument transformers and other accessory equipment, as well as computation of meter readers' bonuses (for production). No watthour meter can leave the department without a service order, or spare-meter order (issued to meter installers). In all cases the order must be made out first. Records of all meters given to switchboard manufacturers, etc., for future installation, are followed up to insure that meters are not installed or placed in operation without report. All orders to change customers' meters (except where additional load has been connected) must originate with the meter department, and only the superintendent of distribution or company manager shares authority to order meter changes.

Meters are repaired in place, as far as is practicable, to avoid changing. Whenever a meter is changed, the customer, especially if there has been a discussion over bills, is liable to conclude that the meter was wrong. Metermen are required to take every precaution to avoid giving the customer this impression. In all cases where wrong constants or other mistakes or omissions on the part of meter-department employees which result in revenue loss to the company or in over-charge are discovered, the department head notifies the chief accountant in writing, giving full details. The distribution superintendent is also informed.

Testing Responsibilities

The department head is responsible for making special tests requested by other company departments, including cable, transformers, transit oil, etc. Every such test has to be recorded in writing, on a regular form or on a special work memorandum. Unless the test is of a regular routine nature such as watthour meter testing, a copy of the report is filed in the department. All instruments and apparatus in the department and in the company's high-voltage test quarters, with tests and records, are the responsibility of the department head, who sees to it that instruments are loaned only to responsible persons, with loan records, and returned within a reasonable time.

Maximum-demand readings for all customers exceeding 50 kw. are regularly examined in the meter department and the maintenance supervisor notified of any sudden or gradual increases in these values. All installations of "check" meters are followed up to insure proper readings and prompt return. Such meters are read at the same time or at least on the same day as the meters undergoing checks, followed by comparisons of energy consumption readings and reporting of any discrepancies The department head is responsible for the accuracy of the Constant Meter Record card file, and for personally checking all cards in this file against the meter record card just before "constant" cards are checked against the billing records each April and October.

Meter Installations

When new meters are bought, the department head personally checks the meter record cards for all new polyphase meters and for all new meters of any kind having a constant other than one. He endorses with date and initials when correct. If the meter has a constant other than one, a constant meter record card is made out.

The department head is required personally to inspect every installation having a meter constant other than one, checking service order, constant meter record, meter record and meter reading cards against each other, initialing and insuring their correctness. If instrument transformers are used, he checks all transformer ratios and connections at the time the meter is made alive. The foregoing cards are then re-checked by the meter foreman and returned to the department head. All main office clerical work in connection with such installations is personally followed by the latter, and errors, if any, corrected. The foregoing procedures are followed by him and by the meter foreman whenever there is any change in the meter, constant, instrument transformers, or other metering accessories at such a meter location.

All three-phase meters, all two-element meters connected to polyphase systems, all three-wire, single-phase, 115/230-volt meters rated 25 amp. or over are inspected within five working days of installation by a man com-

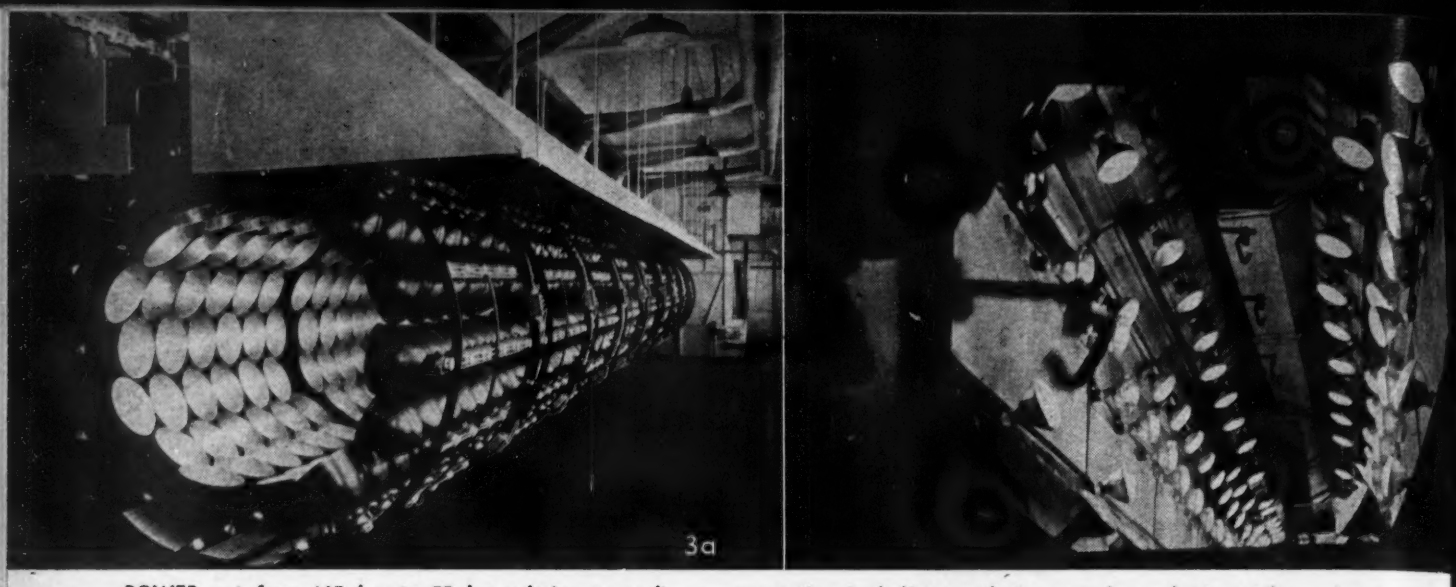
1—Meter record card (4 in. x 6 in.) includes space for test data on reverse side . . . 2—Service order form (5½ in. x 7½ in.), gives meter and customer information . . . 3—Form for issuance of spare meter (original size, 4 in. x 5½ in.) . . . 4—Constant meter record card (3 in. x 5 in.) . . . 5—Meter reading card from 4¼ in. x 8 in.) . . . 6—Form used in demand meter removal (5 in. x 8⅝ in.); space at bottom for remarks . . . 7—Form for special work report (8½ in. x 4⅞ in.) . . . 8—Form to report defective ground on customer's premises (4¼ in. x 5 in.) . . . 9—Meter reading examination sheet for new employees (original, letter size). Ten sets of test readings are presented on the complete sheet

petent to check meters, connections, testing facilities and incidental wiring. An exception is made for a meter already inspected by the department head. He or the meter foreman personally inspects all meters operated with instrument transformers yearly between January 1 and February 15, also checking and correcting, if necessary, constant meter record cards. These cards are personally checked every April and October against billing records. The company treasurer is called upon to furnish personnel to handle the billing end. The check is made at the main office, to which the foregoing cards are temporarily taken by the department head or by the meter foreman. Any discrepancies discovered are reported to the superintendent of distribution, who in turn reports these to the treasurer.

Demand Meters

The department head sees that every watthour meter in service having a demand attachment not of the graphic type is changed every three years, the old meter being removed and replaced by a new or repaired meter. Every watthour meter in service having a graphic-demand attachment is either changed at the same interval or the timing and resetting device replaced. Such meters are divided into 36 sections for scheduling changes. Regular service orders are made out for each installation and removal, and all required checking performed as in new installations.

The industrial sales department is notified whenever a demand meter is removed, giving the date and reason for removal. This is in addition to other routine records and includes meters which are removed for change under the three-year schedule. Setting of time clocks on two-rate meters is a responsibility of the department head. These clocks are checked four times a year, at the beginning and end of daylight saving time and as close as may be to August 1 and December 1 of any given year.



POWER cut from 165 kw. to 55 by redesign to realize on convection in baking synthetic enamel on sheet metal . . . Lamp tunnel (a) used 165 kw. . . . Modernized unit (b) does job with 55 kw. combining convection and infrared radiation

Faster Baking and Drying With Infrared Heat . . . I

Some processes take one-fourth the time, much less factory space, if attention is given to timing of heat application, best product exposure, use of elevated ambient temperatures and air recirculation*

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MANY INDUSTRIAL processes can be cut to a small fraction of their former infrared cycle with corresponding savings in factory space and improved working conditions. Materials of light as well as dark colors can be processed equally well by attention to five quality factors:—

1. More precise control of the rate at which heat is transferred to the intended products rather than reliance solely on temperature control.
2. Application of proper amount of heat at the most advantageous time in the heating cycle.
3. Proper product exposure and judicious use of infrared energy as affected by conveyor loading or oven-space utilization.
4. More effective control over duration of heating to correspond with product variations or use of supplemental means to minimize product variations.
5. Use of elevated ambient temperatures in combination with radiant heat and suitable provision for air recirculation.

Infrared heating is a comparatively new technique and it is not strange that unsatisfactory results have been obtained because inadequate attention has been given to factors which still deserve better recognition. These are the "quality factors" cited above. If they are neglected, one or more of the following adverse results may occur in the case of curing synthetic resins:—

a. Light colored organic pigments may be objectionably discolored
b. Vitamins may be destroyed in pharmaceutical or food products
c. Distortion, warping or checking may occur in wood products
d. Internal moisture may be trapped through case-hardening in dehydration processes.

Uniformity of Heat Application

The first and foremost quality factor in radiation heating is uniformity of heat application. It is too often taken for granted, either because long-time convection processes have not required precise consideration of the uniformity of heat transfer or because thermostatic control has provided average results of sufficient accuracy. Temperature measurements serve as an adequate guide in establishing heat-transfer rates under stabilized conditions and with products having uniform properties. As customarily applied on a production scale, temperature measurements may control average or ultimate temperatures, but there can be no assurance that several products, or even all parts of the same product, will attain a desired temperature at the same time, particularly when air temperature is relied upon as the controlling medium.

In convection ovens the time gradient in attaining temperature is influenced extensively by the velocity of air in contact with product surfaces. With infrared heating it is directly proportional to the concentration of energy intercepted by the product surfaces, all other factors being equal. Uniformity of heat transfer accord-

* Adapted from an A.S.M.E. paper.

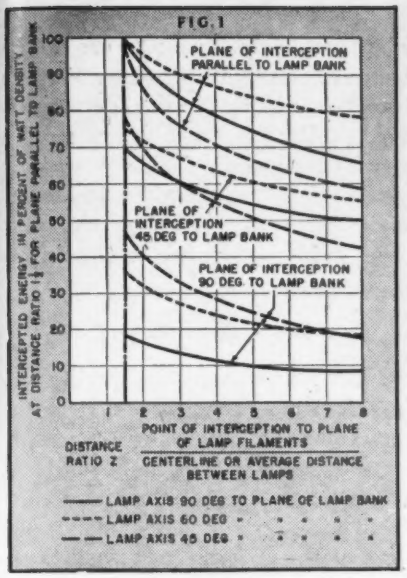
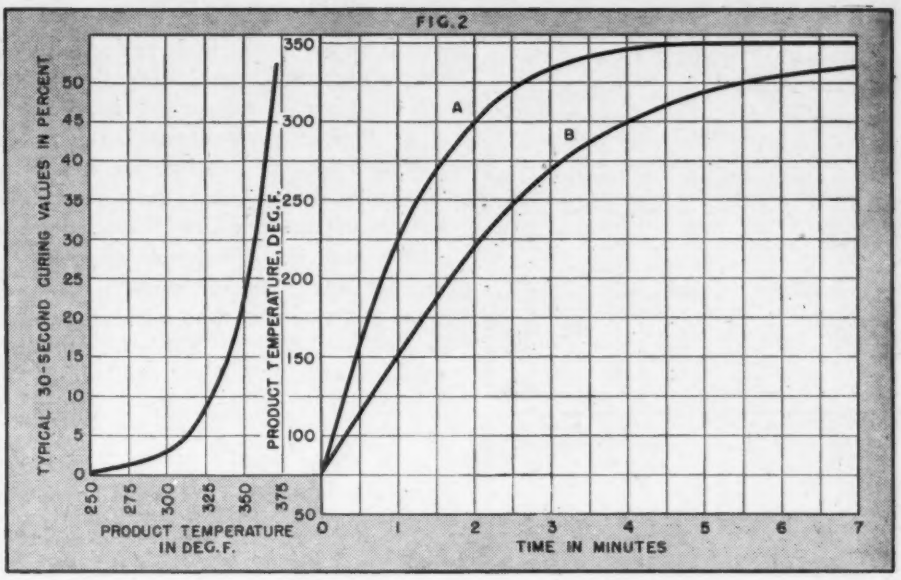


FIG. 1
INTERCEPTED ENERGY IN PERCENT OF WATT DENSITY AT DISTANCE RATIO 1½ FOR PLANE PARALLEL TO LAMP BANK
PLANE OF INTERCEPTION PARALLEL TO LAMP BANK
PLANE OF INTERCEPTION 45 DEG TO LAMP BANK
PLANE OF INTERCEPTION 90 DEG TO LAMP BANK
POINT OF INTERCEPTION TO PLANE OF LAMP FILAMENTS
DISTANCE RATIO Z
CENTERLINE OR AVERAGE DISTANCE BETWEEN LAMPS
LAMP AXIS 90 DEG TO PLANE OF LAMP BANK
LAMP AXIS 60 DEG
LAMP AXIS 45 DEG



ENERGY DISTRIBUTION characteristics of large banks of Type R-40 infrared lamps (Fig. 1) with lamps placed at angles. Variation in curing performance (Fig. 2) obtained by non-uniform heating of typical synthetic resin finishes. A—Typical temperature curve for surfaces of a sheet metal product handled parallel to the plane of a lamp bank. Total cure 178 percent . . . B—Associated temperature curve on the corresponding product surfaces located perpendicular to the plane of lamps with a maximum to minimum energy ratio of 3.8. Total cure 50 per cent . . . Corrective Measures: 1—Change lamp arrangement to provide a uniformity ratio of not more than 1.8 in combination with a convection air temperature of not less than 260 F. Improved cure values,—A, 122 percent; B, 105 percent . . . 2—Change baking cycle to 315 F. for 14 minutes to obtain an average 110 per cent cure with a maximum to minimum variation of 12 percent . . .3—Rotate product continuously through oven to provide slower but more uniform heating and extend cycle as required

ingly depends upon the energy distribution characteristics of the lamp bank and the relative location of the product surfaces with respect to the lamp bank. Since infrared heating is usually employed for short time-cycle processes as compared with convection heating, the uniformity of heat application becomes much more critical and therefore of primary importance in the application of lamp equipment to thermal processes.

Lamp Angles in Bank

Maximum energy available at various distances and in various planes from a single bank of lamps is shown in Fig. 1, with 100 percent representing the average heat concentration in the plane parallel to the lamp bank and at a distance equal to 1½ times the average spacing of the lamps. The actual values in watts per square inch for various combinations of lamps and spacings are given in Table I as obtained by photometric calculation.

One conclusion to be drawn from Fig. 1 is that the energy in any given plane diminishes very little with increasing distance from the lamps, although this is decidedly not the case if the principal dimensions of the bank do not extend beyond those of the desired heating zone by approximately twice the maximum distance between lamps and the point where heating is desired.

Energy available at 45 deg. or 90 deg. to the plane of the lamps is decidedly less than that in the parallel plane due to the desired directional control provided by the characteristic energy-distribution pattern of individual lamps. Considerable variation in the values for distance-squared must be anticipated in handling three-dimensional products. Energy distribution, governing the "watts for steradian" values, is fixed by numerous other considerations, but the cosine of the angle of interception may be changed at will by shifting the axis of lamps. This procedure was first reported by the author in ELECTRICAL WORLD, July 11, 1942, (pages 80-82).

In some installations, uniformity ratios will be improved (reduced) through the heating of surfaces in the 90-deg. plane from lamp banks on three or four sides rather than from two sides. In any event the superior performance obtained with lamps located at 45 deg. or 60 deg. to the plane of the lamp bank is well established.

While uniformity of heat transfer between planes is not always necessary, its importance on three-dimensional heating applications involving thermal processes such as the polymerization of synthetic resin finishes is shown in Fig. 2. Curing results will vary with physical properties of the material, which in this case are governed by the performance curve shown at the left. The product temperatures (Curves A and B) demonstrate non-uniform curing approximately in the ratio of 3 to 1 which corresponds closely with the 3.8 to 1 uniformity of energy distribution to the surfaces.

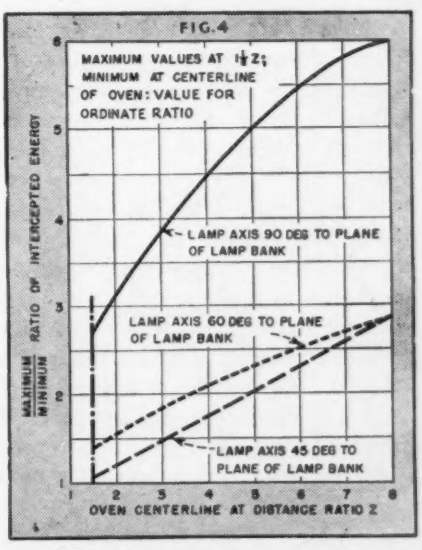


FIG. 4
MAXIMUM VALUES AT 1½Z; MINIMUM AT CENTERLINE OF OVEN: VALUE FOR ORDINATE RATIO
MAXIMUM / MINIMUM RATIO OF INTERCEPTED ENERGY
LAMP AXIS 90 DEG TO PLANE OF LAMP BANK
LAMP AXIS 60 DEG TO PLANE OF LAMP BANK
LAMP AXIS 45 DEG TO PLANE OF LAMP BANK
OVEN CENTERLINE AT DISTANCE RATIO Z

PERFORMANCE ANALYSIS of typical R-40 industrial infrared lamp ovens

TABLE I

Energy Concentration Corresponding to 100% for Representative R-40 Lamp Banks

Average Lamp Spacing in Inches	Watts Per Square Inch 250-W. Lamps	375-W. Lamps
6 in. x 6 in.	5.0	7.5
6½ x 6½	4.2	6.3
7 x 7	3.7	5.5
7½ x 7½	3.2	4.8
7 x 10½	2.4	3.7
8¼ x 8¼	2.6	3.9
8½ x 9	2.34	3.5
10½ x 10½	1.63	2.45
5¼ x 6½—90 deg.	5.25	7.90
5¼ x 6½—60 deg.	4.77	7.15
5¼ x 6½—45 deg.	4.60	6.90
Noon summer sunlight at sea level	0.70	

Lamp axis is 90° to axis of oven unless otherwise indicated.

Actually the 7-min. length of the cycle in Fig. 2 is adequate for a 122 to 105 percent cure with improved uniformity of energy distribution. Without this consideration, it will be necessary to double the time and consequent size of the oven (if conveyorized) to produce the required end result with an appropriate reduction in service temperature.

Zoned Heat Transfer

The second quality factor relating to the effective use of infrared energy for industrial heating is the application of the proper amount of energy at the most advantageous time in the cycle. Faster heating through higher concentrations of energy early in the cycle might result in complete curing of the material, Fig. 2, in possibly three minutes at a maximum temperature of 375 F. With uniform application, radiation can often be applied in such concentration as to produce high skin temperatures for curing surface coatings, with a minimum of heat loss through the cross-section of a product. Skin heating in this manner may reduce the total energy consumption on some applications to a point that will preclude the consideration of other methods of heating regardless of potential fuel-cost advantages. The after-cooling problem is also diminished with skin heating.

Case hardening can often be avoided in water evaporation processes by following the technique used in skin heating. Here high concentrations of energy early in the cycle will provide necessary heat of evaporation through the mass of a product while water is still present to serve as a heat-conducting medium. When this procedure is not followed, products having low thermal conductivity may case harden, greatly reducing the effectiveness of subsequent heating.

Another advantage resulting from directional control of infrared is the possibility of tailoring the quantity or rate of heat transfer in a portion of the oven cross-section to compensate for large mass variations in some types of products, thus avoiding excessive temperature gradients that might result with other methods of heating. The ability of lamp equipment to put the right amount of heat on the right part of the product at the right time in the cycle is an asset that to date has still not received adequate recognition.

Exposure and Space Utilization

The third quality factor relates to the proper exposure of product surfaces both from the standpoint of producing effective heating results and employing the energy provided.

Materials having high thermal conductivity usually require exposure only on one side of principal surfaces. Materials of low thermal conductivity should be exposed from both sides if the temperature gradient through the cross-section is to be held to a minimum. Materials that are transparent or act as reflectors to infrared energy should preferably be processed by other methods of heating.

Space utilization in infrared ovens will appreciably influence both performance and operating economy. Surfaces should not be allowed to eclipse each other for reasons of providing uniform heat application. On the other hand, poor space utilization by the products to be heated may result in reduced conversion of radiant energy to sensible heat with an associated drop in efficiency. Where alternate methods of material handling are available, wide, slow-speed streams of work usually result in more efficient oven design and are to be preferred to narrow and correspondingly higher speed operations which invariably require greater space.

The fourth quality factor relates to uniformity of product and the necessity of providing means for varying amount of exposure if the product or method of material handling compels extensive latitude in the amount of exposure. This often occurs in evaporation processes where granular, fibrous or leafy products are to be handled. Granular products may be turned mechanically during processing. Other products may require gravity separation during processing so that fully processed parts are removed from the heating zone while other parts are allowed to remain for prolonged heating.

Atmosphere Control

Finally among the five quality factors is atmosphere control. If the atmosphere in contact with the product does not approach the desired surface temperature or velocities are excessive, results will be counter to the heating objective. If the velocities are not adequate to remove vapors as produced during the curing of most synthetic coatings, loss of gloss and porosity may result with a sacrifice in the desired protection, appearance and durability qualities.

Relatively high velocities may be helpful during the final stages of water evaporation processes. Except for such processes, temperature stability is almost directly dependent on the atmospheric conditions immediately surrounding the product. It is therefore evident that some convection is an essential requisite of most if not all infrared heating applications. Fortunately lamps produce both convection and radiation, but until recently few installations have taken advantage of this fact.

A large portion of the convection occurs by conduction to the air in contact with the lamps. The amount of heat thus produced depends upon the extent to which lamps are kept clean. Velocity of air is highly desirable, particularly in higher temperature ovens, as it has a favorable influence on lamp life. With average housekeeping, it is conservatively estimated that 25 percent of the total energy input is thus dissipated.

The use of convection inherently necessitates insulated construction if air temperatures are to be maintained at or near service temperatures above 180 F. This also provides two important advantages often overlooked in infrared heating practice, reduction in heat losses by secondary radiation from the heated products and the absence of condensation on oven walls brought about by maintaining relatively high inner-wall temperatures.

Transformer Failures And Fuse Blowings

Summary of 1935-1944 experience of 21 electric utilities in Pennsylvania reporting for over 200,000 transformers

OVER A 10-YEAR period the Transmission and Distribution Committee of the Pennsylvania Electric Association has compiled reports about transformer failures from up to 21 member companies involving well over 200,000 transformers. The accompanying summary reflects the progressive betterment in performance obtained over the decade by resort to interconnected neutrals, improved transformer design and protection and more thorough inspection and maintenance.

Detailed data for 1943 and a comparable number of distribution transformers were published in ELECTRICAL WORLD, March 17, 1945, page 92.

Transformer Failures—1935-1944, Incl.

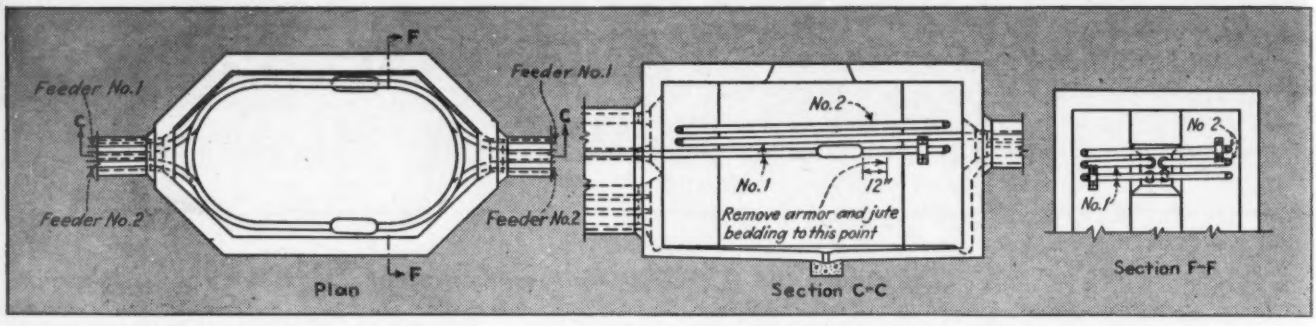
	TOTAL			With External L.A. and Interconnected Neutrals			With External L.A.: Neutral Not Interconnected			Total With External L.A.			Total Without L.A.			Self-Protected			Completely Internally Protected		
Year	Total No. of Transf.	Total No. of Fail.	Total Fail. per 100 Transf.	No. of Transf.	No. of Fail.	Rate per 100	No. of Transf.	No. of Fail.	Rate per 100	No. of Transf.	No. of Fail.	Rate per 100	No. of Transf.	No. of Fail.	Rate per 100	No. of Transf.	No. of Fail.	Rate per 100	No. of Transf.	No. of Fail.	Rate per 100
1935...	125,168	1,542	1.23	19,802	144	0.73	41,237	418	1.02	114,013	1,331	1.16	10,410	226	2.17	*2,170	13	0.60	*	*	*
1936...	134,953	2,137	1.58	45,211	279	0.62	74,537	1,560	2.09	119,748	1,839	1.53	10,409	259	2.48	2,878	24	0.83	1,918	15	0.78
1937...	142,941	1,785	1.25	35,655	238	0.67	71,258	744	1.04	127,596	1,575	1.24	7,126	94	1.32	6,116	80	1.31	3,269	15	0.46
1938...	155,851	1,267	0.81	49,940	333	0.67	52,571	465	0.88	102,511	798	0.78	6,433	124	1.93	4,175	76	1.82	4,353	14	0.32
1939...	161,153	1,148	0.71	43,415	214	0.49	47,019	475	1.01	90,434	689	0.76	5,684	104	1.83	6,871	36	0.52	6,790	28	0.41
1940...	177,585	1,368	0.77	35,707	228	0.64	38,394	439	1.14	138,411	1,145	0.83	5,810	49	0.84	8,668	39	0.45	8,878	46	0.52
1941...	184,123	1,082	0.59	38,772	243	0.63	28,390	188	0.66	139,792	842	0.60	4,173	54	1.29	7,855	27	0.34	10,819	45	0.42
1942...	204,703	1,152	0.56	53,333	278	0.52	42,148	245	0.58	178,393	1,011	0.57	4,993	80	1.60	7,984	24	0.30	13,333	37	0.28
1943...	205,526	1,178	0.57	66,594	325	0.49	27,962	240	0.86	180,009	1,057	0.59	3,904	36	0.92	8,099	31	0.38	13,514	54	0.40
1944...	214,081	1,340	0.63	36,993	179	0.48	17,453	104	0.60	172,687	1,093	0.63	3,328	46	1.39	7,721	38	0.49	14,270	51	0.36
Total:			0.82			0.58			1.10			0.84			1.71			0.62			0.40

NOTE:(*)— Completely Internally Protected and Self-Protected combined. Not included in total.

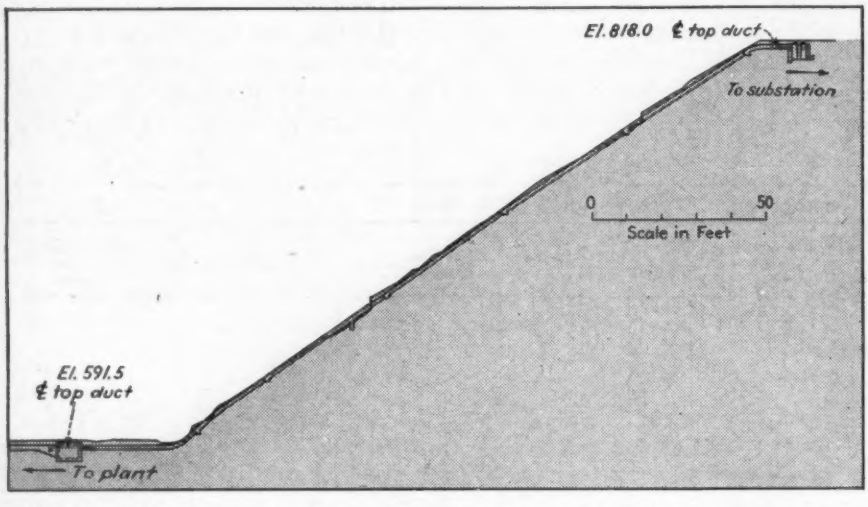
Fuse Blowings—1935-1944, Incl.

	TOTAL			With External L.A. and Interconnected Neutrals			With External L.A. Neutral Not Interconnected			Total With External L.A.			Total Without L.A.			Self-Protected			Completely Internally Protected		
Year	No. of Transf.	No. of Fuse Blwgs.	Rate per 100 Transf.	No. of Transf.	No. of Fuses	Rate per 100 Transf.	No. of Transf.	No. of Fuses	Rate per 100 Transf.	No. of Transf.	No. of Fuses	Rate per 100 Transf.	No. of Transf.	No. of Fuses	Rate per 100 Transf.	No. of Transf.	No. of Fuses	Rate per 100 Transf.	No. of Transf.	No. of Fuses	Rate per 100 Transf.
1935...	59,620	2,375	3.98	.....	.....	3.36	.....	.....	.....	.....	.....	3.96	.....	.....	4.10	.....	.....	.....	.....	.....	.....
1936...	83,480	5,226	6.26	.....	.....	5.58	.....	.....	7.30	.....	.....	6.58	.....	.....	4.42	.....	.....	.....	.....	.....	.....
1937...	68,030	3,592	5.28	.....	.....	3.09	.....	.....	6.37	.....	.....	5.18	.....	.....	3.11	.....	.....	.....	.....	.....	.....
1938...	72,000	2,880	4.0	.....	.....	2.65	.....	.....	5.14	.....	.....	4.02	.....	.....	1.95	.....	.....	22.6	.....	.....	.....
1939...	200,800	8,494	4.23	.....	.....	4.14	.....	.....	5.65	.....	.....	5.02	.....	.....	1.46	.....	.....	17.0	.....	.....	0.91
1940...	153,585	6,512	4.24	.....	.....	3.76	.....	.....	7.41	.....	.....	5.47	.....	.....	1.78	.....	.....	*0.74	.....	.....	0.47
1941...	184,217	8,824	4.79	.....	.....	5.72	.....	.....	9.70	.....	.....	7.45	.....	.....	1.32	.....	.....	*0.59	.....	.....	0.42
1942...	101,414	6,474	6.38	40,448	1,858	4.59	24,931	1,681	6.74	68,731	4,357	6.33	2,681	153	5.71	6,214	1,604	25.8	6,571	25	0.38
1943...	97,079	6,774	6.98	39,475	1,305	3.31	20,277	551	2.72	69,514	4,429	6.37	3,904	514	13.18	6,185	1,322	21.37	5,449	31	0.57
1944...	100,204	5,743	5.74	34,828	1,438	4.14	17,453	931	5.33	89,198	4,302	4.82	3,328	734	22.0	7,674	707	9.21	14,270	86	0.61

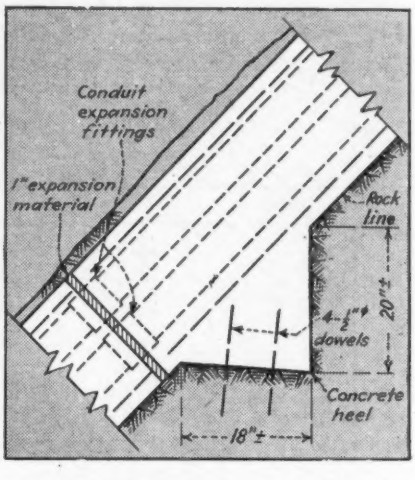
NOTE:(*)— Companies with high rates did not report this item.



CABLE ELONGATION is absorbed in the expansion loop at the lower manhole, approximately 7 ft. by 12 ft



PROFILE of the duct envelope follows the general line of solid rock, with 226-ft. difference in elevation and slope angle of 44 deg.



CONCRETE HEEL poured on solid rock, with four ½-in. dowels, supports the expansion fittings at 40-ft. intervals

Uphill Cable Solves Problem

Above-surface installation used on solid rock hill 226 ft. high. Decision for cable based on hazards for overhead line

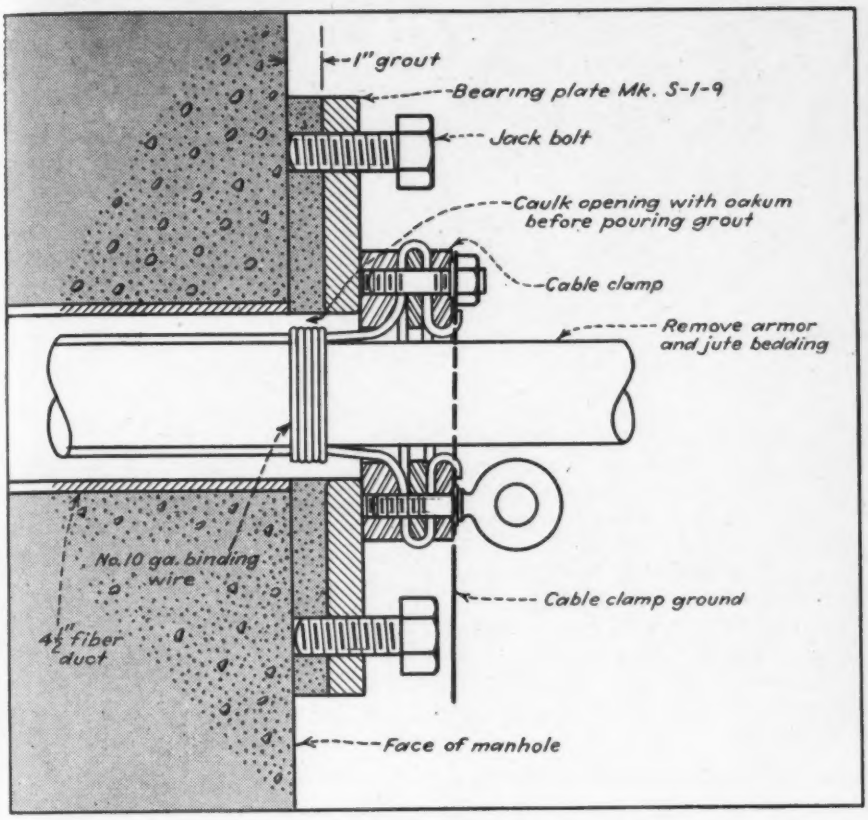
R. G. MEYERAND
Electrical Engineer
Union Electric Co. of Missouri
St. Louis, Mo.

CONDUIT and cable up a cliff 226 ft. high and sloping at an angle of approximately 44 deg. offered many problems in design and construction, but this unusual solution was justified by still other conditions in the vicinity of the Osage Hydro-Electric plant. The circuits operate at 13.8 kv. directly from the main generator buses to a step-up transformer substation for local distribution at 34.5 kv. The plant design at Osage, and the associated transmission at 132 kv., did not contemplate the local load which is now about 5,000 kw.

Because of high water in the spring and fall it was advisable to locate the 13.8/34.5-kv. substation at the top of the cliff. The lightning incidence in the vicinity is high and because of the connection to the main bus it was felt that overhead construction would be too hazardous. The decision to use underground cable was followed by consideration of gas-filled cable and oil-filled cable but these alternatives were subsequently rejected.

Based on cost and simplicity, three-conductor, shielded, dry-wipe, V. C., lead, armored bore hole cable was selected. It is similar to the cable used in nearby mines. The duct was placed directly on the surface, because of the cost of cutting the rock, and this arrangement with exposure to the sun made it necessary to select the cable size for high ambient temperature.

Transite conduit was used to keep the sliding friction of the cable as low as possible, and four 4½-in. I. D.



WEIGHT of the cable is carried by the clamping ring and bearing plate at top of cliff

STRAIGHT UP the hill is the general plan of this above-surface underground duct and cable installation

ducts are carried up the hill with standard conduit spacer blocks at 4-ft. intervals. The duct envelope follows the approximate contour of the hill, without abrupt changes in slope or excessive excavation of hard rock, and is supported by concrete columns at points where the duct envelope does not rest on solid rock. Concrete heel supports, as shown in the accompanying detail, were poured onto solid rock at approximately 40-ft. intervals, and expansion fittings were installed at these locations in the cable run.

Provision For Expansion

Elongation of the cable due to temperature was estimated to be about six inches, and an expansion loop was provided at the lower manhole.

The entire weight of the cable is carried by means of a special clamping ring and bearing plate in the manhole at the top of the cliff. The supporting structures were designed on the basis of the ultimate strength of the steel armor wires which is considerably in excess of the total dead weight of the cable.

High pressure connectors were used in the splices at the top and bottom manholes to decrease the possibility of soldered sleeves pulling loose. The cable armor as well as the sheath were solidly grounded in the manholes at the top and bottom of the hill.

Practices Vary in Use of Aerial Cable

SHIELDING or conducting jackets are favored for 5-kv. aerial cables and the cables will not be worked hot by a majority of users who answered a recent questionnaire. However, on the basis of experience the opinion on shielding is almost equally divided, and four of the nine companies are uncertain of their final recommendation. Dead-ending and fanning out conductors is the practice at transformer installations and branches of two-thirds of these companies.

These conclusions are from answers to a number of questions asked in connection with a review of aerial cable practices prepared for the Missouri Valley Electric Association. The nine companies, having a total of 187 miles of cable in service, are located in the Eastern and Mid-Western states. The questions and answers are summarized in the following tabulation:

	Yes	No
Are transformer stations and branch mains tapped into cables without dead-ending and fanning out conductors?	3	6
Are cables worked hot?	2	7
Are conducting jackets or any type of shielding used on 5-kv. aerial cables?	7	2
On the basis of your experience, do you recommend that conducting jackets or shielding be used on 5-kv. aerial cable conductors? (4 ans'd. uncertain)	2	3
Have you ever had occasion to carry more load on an aerial cable than the manufacturer recommended?	2	7

By Fred P. Gilpin, Electric Distribution Dept., Kansas City Power & Light Co., Kansas City, Mo.

Combination Utility Ups Gas Rates, Lowers Electric

THEODORE BRAATEN
General Manager, City of Norwich (Conn.) Gas and Electrical Department

Electric revenues helping to pay for gas service, according to cost-to-serve study made for municipal utility. Rates are changed to make each service pay its own way.

And something new is added. Television is seen as imposing on system an undiversified load comprised of receiver demand plus foreground lighting. Anticipated cost to serve is met by rider on residential electric rate.

"TO IRON OUT inequalities that previously existed," quoting from the local newspaper, was the purpose of a comprehensive revision of rate schedules May 1, 1947, by the Norwich (Conn.) Gas & Electrical Department. Inequalities were of two kinds. One was the disproportionate share of cost of the combined utility borne by the electric side of the business.

Another inequality lay between classes of customers. Net earnings of a municipal utility, going into the general city fund, have the effect of reducing taxes; perhaps in these times it is more nearly correct to say the effect is to slow up tax increases. However the benefit appears, we believe it should be apportioned fairly between taxpaying groups in relation to their contributions to utility earnings. For example, if half the earnings come from one class of customers which represents only 10 percent of the tax roll, then this class benefits from utility earnings only one-fifth what it should. In theory, rates should be reduced to the point that this class contributes only 10 percent to utility earnings.

What made the headlines, however, was the inclusion of a television or video rider in the residential electric rate. This innovation forecasts additional cost of providing service to customers who install receivers.*

The Board of Gas and Electrical Commissioners acted on the findings of a 1945 cost analysis of utility services conducted by E. Irvine Rudd, an associate of the firm of William S. Leffler Engineers Associated. The figures of "cost-to-serve" in each revenue classification, both gas and electric, disclosed that existing rate schedules did not properly reflect the progressive costs of service, and produced unreasonable disparity between rates of return earned by the gas and electric departments.

Major objectives of the rate change were set up to:

1. Increase domestic, commercial and industrial gas revenues and returns to meet increased costs of labor, fuel, etc.

2. Increased minimum charges and decrease follow-on prices in domestic and commercial gas schedules in conformance with demonstrated progressive costs-to-serve of these classifications.

3. Eliminate the unpopular "room charge" from domestic electric-service rates and cover the cost of service to television receivers but reduce total revenue from residence electric service.

4. Increase minimum charges and decrease follow-on steps of the commercial electric schedule to adhere more closely to the cost pattern of this service class, and simultaneously to reduce total commercial electric revenue.

5. Rationalize the departmental rates of return by more than doubling former low gas-service return, and make a nominal reduction in earnings of the electrical department without materially increasing over-all return of the combined gas and electric operations.

The following specific instances indicate ways in which the objectives were approached:

The residential electric minimum monthly bill, which averaged $1.20 for 5 kw.-hr., is decreased to $0.99 by elimination of the "room charge." As a result, the bill for 25 kw.-hr. drops from $1.79 to $1.62. The television rider puts a net charge of $1.26 per month on each receiver installation. The rider goes into effect where inspection shows a television antenna.

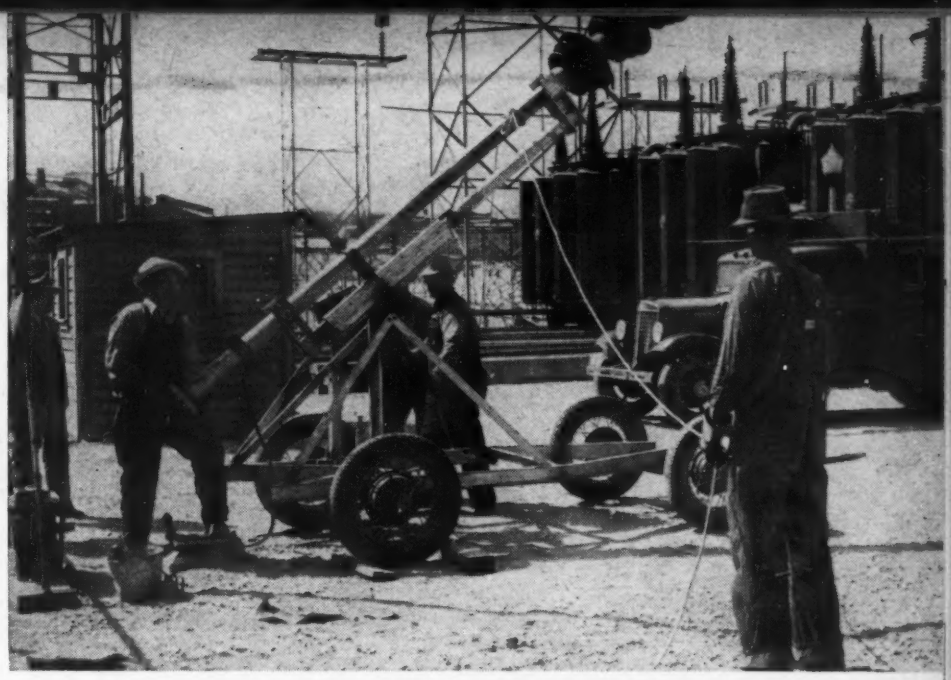
In residential gas rates the minimum bill is increased from $0.90 to $1.60 but the amount of gas included is raised from 100 to 500 cf. The cost of the first 2,000 cf. is thus increased from $3.26 to $3.40.

In commercial electric service the minimum billed demand has been changed from 100 watts to 1 kva. thereby raising the minimum from $0.85 to $2.52. Under the old rate a customer with a 100-w. demand paid only $2.19 for 50 kw.-hr., while one with a 1-kw. demand paid $5.44. The new rate puts these two customers level with bills to each of $4.54 for 50 kw.-hr.

The commercial gas minimum bill is increased from $1.20, including 100 cf., to $2.50, including 300 cf. Cost of the first 2,000 cf. rises from $3.38 to $4.54.

Rates for both gas and electric service to industrial customers are revised upwards and fuel-adjustment clauses added to each.

*Service to television receivers is reckoned to be without significant diversity. Also because of the high brightness of modern television pictures—up to 8⅓ foot-lamberts—it appears that people may want supplemental foreground lighting of 500 to 1,000 watts to prevent eye strain from two to three hours of viewing night after night. Thus the demand of a television receiver is seen as a direct and substantial addition to peak-load costs.



INSULATOR and stand being lowered preparatory to changing insulator assembly

Tilting mechanism on trailer replaces pedestal assemblies with clean insulators while bus remains energized . . . Deposit is then softened by chemical and rubbed off

Mobile Hoist Changes Insulators

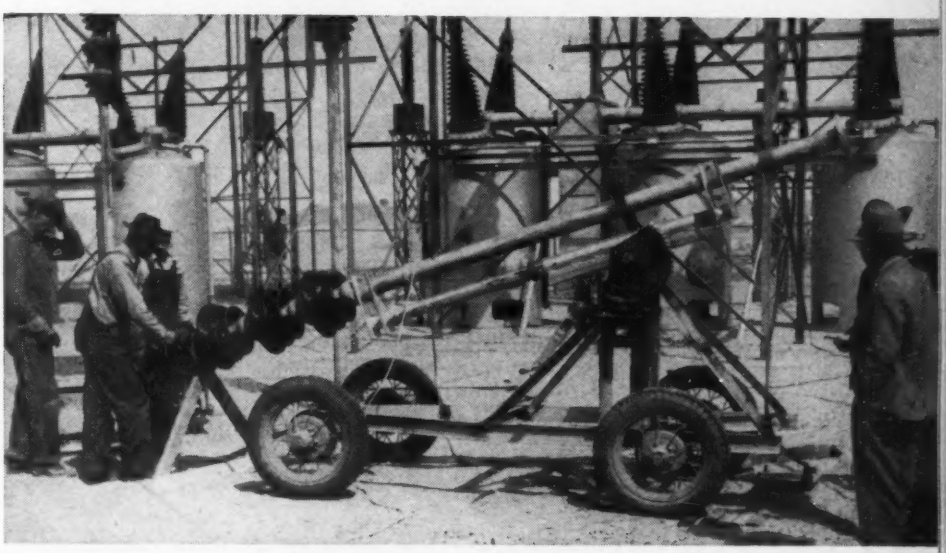
W. H. BLANKMEYER
The Montana Power Co., Butte

SUBSTATION-BUS insulators near a large copper smelter accumulate a cement-like dust deposit that cannot be removed by simple washing or wiping. Once-a-year schedule calls for replacing fouled units with clean ones. To facilitate insulator change with bus energized, Carl Davis, relay engineer for Montana Power Co., has developed a hoist with unusual features.

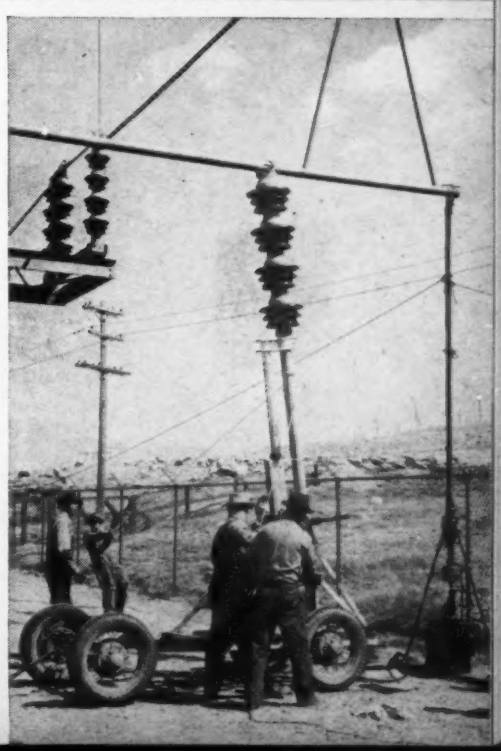
Framework, mounted on four wheels, supports a boom which can swing from vertical to horizontal by hand crank through a bevel-and-worm gear train. Boom clamps close around an insulator pipe stand grounded by a heavy flexible lead and base bolts are removed. A 90-deg. turn unlocks the insulator bus-clamping fingers and the entire assembly is swung down to horizontal position.

Wood supports hold the insulator assembly while it is unbolted, and relieve the bending moment at the joint. The trailer is rigidly braced to maintain alignment of gear and boom assembly.

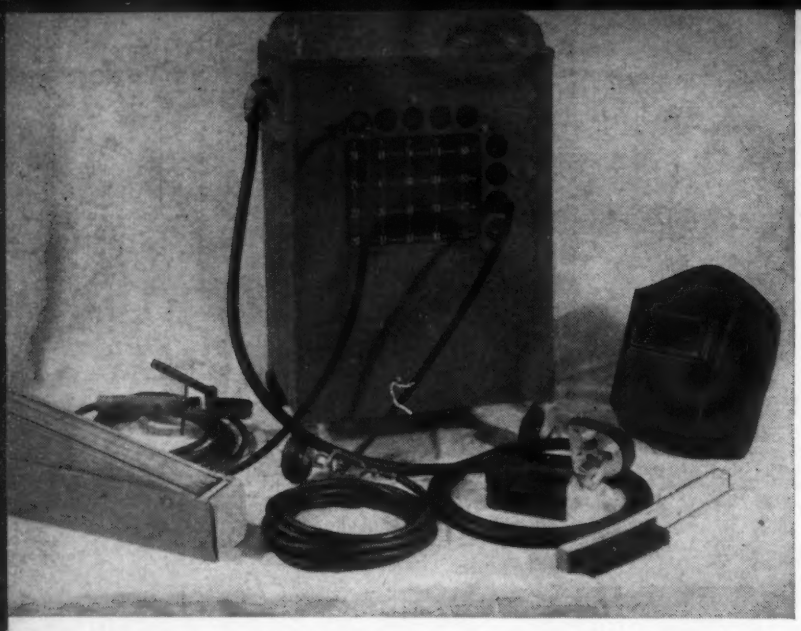
During the operation, a special heavy-duty hot-stick with bus-clamping fingers steadies the bus structure. A stock of clean insulators cuts actual change time, with the use of the hoist, to a fraction of that needed for cleaning methods previously employed.



INSULATOR-PIPE assembly shown loaded on trailer to be elevated to vertical . . . Clean insulator (right) on end of permanent pipe stand being swung into place



Insulators to be cleaned move into a shop where they are immersed in a 2-oz. per-gallon water solution of "Turco Sil Sol" for 15 min. The chemical action of this solvent is the only method so far found that avoids use of steel wool to cut through the deposit. After softening in the chemical, the residue is removed by rotating the insulator in a lathe-like assembly where a light rubbing action at about 700 rpm. produces a clean polished surface.



LIMITED-INPUT-TYPE transformer arc welder with schedule of current taps and auxiliaries

Transformer

Limited-input-type transformer arc welder standards outlined in this article apply to farm installations served by REA systems and include recommendations for supplying such services

F. B. SCOTT
Senior Engineer,
Technical Standards Division
Rural Electrification Administration
Washington, D. C.

EXTENSIVE USE of arc welding in the production of war material gave widespread publicity to the art and thousands of farm people who worked in war plants became familiar with the use of welders. They realized that a welder on the farm would enable them to save hours or days of time by immediate repair of broken farm implements and machinery. As a result there has been a great demand for electrical service for transformer-type arc welders on rural systems.

From the system operating standpoint, arc welders which were on the market in past years were not a desirable or profitable load when used in the farm workshop due to high demand and low energy usage. In many cases, arc welders were connected to the system without the knowledge of the manager, resulting in the burnout of the transformer serving the user. In other cases where the system manager was notified, it became necessary to install a larger distribution transformer, and the increased core losses usually were more than the energy used by the welder. Low power factor resulted in high kva. demands which created voltage flicker on long branch lines. In areas where more than one member was served with the same distribution transformer, the welder became a source of objectionable radio interference.

TRANSFORMER-TYPE arc welder in another model designed for use on REA single-phase circuits

Solutions in Design

In an effort to solve this problem, REA engineers found that private utilities were faced with the same problem and in many cases were making a demand charge where welders were served. Welder manufacturers were advised as to the problem and realized that a welder which could be used with existing distribution transformer installations would find a greatly increased market.

Recent development of highly stabilized electrodes allowed the design of welders with low (striking) voltage in the neighborhood of 50 volts. The open-circuit voltage, 65 volts or less instead of 80 to 100 volts, resulted in a corresponding decrease in size of the welder, and a proportional reduction in the kva. demand from the power supply. A further reduction in kva. demand was made possible by use of built-in capacitors for power-factor correction.

By using reduced open-circuit voltage and power-factor correction, the welder designer can offer a higher maximum welding-current output for a specified limited kva. input. This type of welder is limited to low-voltage stabilized electrodes which have been developed for mild steel, for many steel alloys, and for hard surfacing. However, this does not restrict usefulness for the service for which the welder is intended. Versatility can be further increased by the use of the carbon-arc torch employing cored carbons for welding aluminum, copper, brasses, bronzes, etc., and for brazing, soldering and supplying heat for pre-heating, tempering, and light forging.

REA Standard

REA engineers and others brought to the attention of NEMA the need for a uniform standard covering this new class of welders so that a manager of a rural distribution system could determine from the name plate on the welder whether or not he should allow its connection to the system. As a result, a new standard was issued for arc welders below 200-amp. rating and designated "Limited-Input-Type Transformer Arc Welders." Simultaneously REA issued Operations

Welders Served by Rural Lines

Memorandum No. 28-1, "Electric Arc Welders." That memorandum contains recommended restrictions in accord with the NEMA Standard together with other recommendations regarding the connection of this type of welder to rural systems. Following is a review of the recommendations contained in that memorandum.

Demand Charge

Arc welders which comply with the following ten limitations should be served without demand charge, provided the member is the only one served from a 3-kva., or larger, distribution transformer. If more than one member is served from the same transformer, the connection of a welder should not be allowed unless a separate transformer is installed to serve the welder, in which event a demand charge of 75 cents per kva. per month should be made for the additional transformer capacity.

Limited-input transformer arc welders shall comply with the following standards:

1. The arc welder shall be designed for operation only on a 230-volt, 60-cycle, single-phase supply circuit.

2. Maximum primary input current shall not exceed 37.5 amp.

3. Maximum open-circuit voltage at any welding-current setting shall not exceed 65 volts with rated name-plate voltage impressed upon the primary winding.

4. The stable short-circuit current for any welding-current setting shall not be less than 100 percent or more than 150 percent of the welding current for that setting.

5. Primary input current at any reduced output setting shall not exceed the rated primary input current.

6. No-load primary input current of a power-factor corrected welder shall not exceed 50 percent of its rated primary input current.

7. The welder shall be equipped with a control switch which complies with Section 6312 of the 1947 National Electrical Code.

8. The welder shall be supplied with suitable three-conductor primary cable, three-pronged polarized plug and matching receptacle, flexible ground cable with suitable grounding clamp, and suitable welding helmet.

9. All welders shall comply with the provisions of the 1947 National Electrical Code, or subsequent revisions, and shall be listed by the Underwriters' Laboratories, Inc.

10. Following minimum information shall be shown on the name plate of the arc welder:

   a. Manufacturer's name, type designation, and serial number.
   b. Frequency.
   c. Primary volts.
   d. Actual maximum primary input amperes at maximum rated secondary output amperes.
   e. Secondary output volts at maximum rated secondary output amperes.
   f. Maximum rated secondary output amperes.
   g. Rated duty cycle.
   h. Temperature rise in degrees Centigrade.
   i. Maximum open-circuit secondary voltage.
   j. Power factor at maximum rated load.

Many manufacturers are now producing welders meeting the above standards. Some welders are being equipped with "arc booster" circuits to aid the inexperienced welder in starting the arc under the limited secondary voltages. These "arc boosters" are acceptable provided they do not exceed the voltage limitations or create unsafe conditions.

Excessive Primary Input

Service to any welders having maximum primary input values in excess of 37.5 amp. is not supplied until a "Large Power Application" has been submitted to REA, whose engineers make a study of the voltage regulation and furnish recommendations as to the necessary additions to the primary distribution system, distribution transformers required, and demand rates applicable.

If possible, consumers now using welding equipment which exceeds the limitations of the Standard should be encouraged to install power-factor correction. Approximately 3 kva. of capacitors should be used per 100 amp. of rated full-load current.

Before allowing connection of other types of arc welders to the distribution lines, information can be secured from REA engineers as to operating characteristics and adaptability for use on rural systems. When requesting such information, include all name-plate data available.

Operator Safeguards

The manager of the rural system should make certain that users of arc welders are familiar with safety precautions. Exposure of eyes to arc rays even for just a flash is temporarily harmful and may result in an inflamed condition which feels like sand in the eyes. Several eye lotions are on the market which ward off ill effects and alleviate the distress. The helmet should be worn for every welding job no matter how small. (Gas-welding goggles do not contain glass dark enough to be effective). The burning effect of the arc rays on the skin, similar to the effect of the sun's rays, makes it advisable to protect the skin as much as possible.

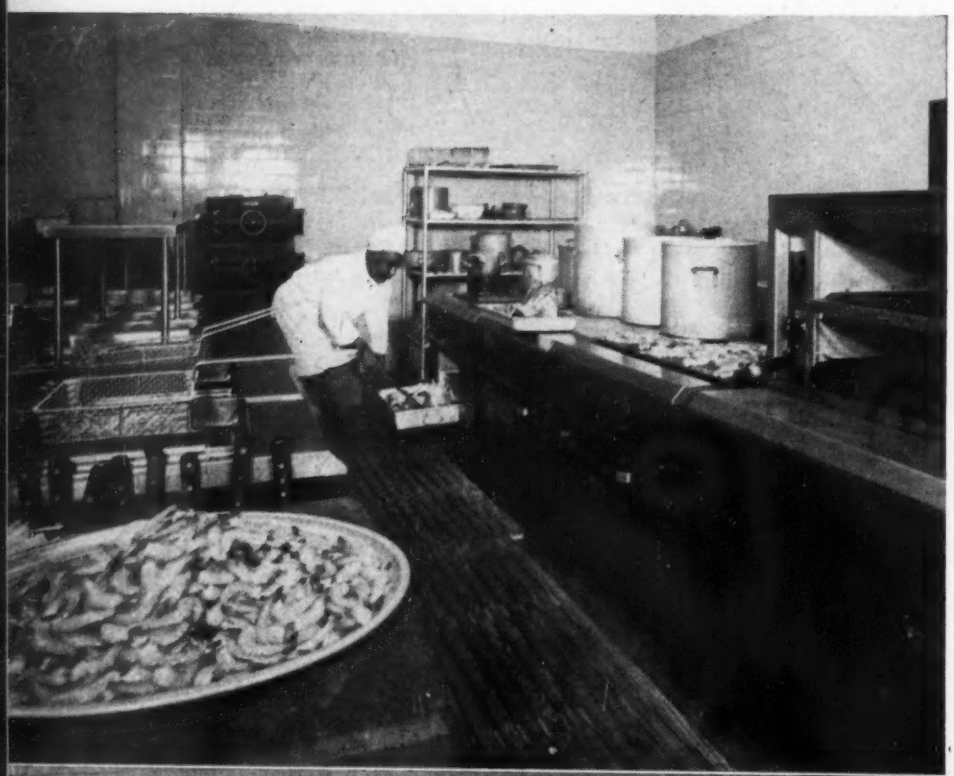
Gauntlet leather gloves should be worn to protect the hands and wrists from arc burn and flying particles of molten metal. Clothing should have a minimum of places for hot globules of metal to lodge, such as pockets, trouser cuffs, etc. High shoes are preferred to low shoes because a serious burn can result when a hot globule of metal enters the shoe. Burns caused by hot metal are slow to heal and require careful attention to prevent serious infection.

If welding has to be done in a confined space, it is advisable to use a respirator. In damp locations precautions should be taken to avoid possibility of shock by accidental contact with the electrode holder.

If the manager of the rural system follows these recommendations, he should be able to extend the use of electricity on the system without impairing quality of service. The consumer can make repairs to farm equipment with a minimum of delay.

Restaurant Modernizes With

High standards of cleanliness and of efficiency in food preparation and serving established and maintained by electrical equipment



HOW a 168-kw., all-electric restaurant kitchen and bakery evolved from the sale of one electric bake-oven and a fry-kettle nine years ago is demonstrated by Birmingham's Joy Young restaurant, remodelled and completely electrified.

A bank of three heavy-duty Edison-Hotpoint ranges, thermostatically controlled and tailor-made for restaurant cooking, totals 66 kw. The owners say they find it easier to teach chefs to use these ranges than any other type and thereby save much food that would ordinarily be wasted. In addition to the ranges, Joy Young uses three Edison-Hotpoint fry-kettles of 7 kw. each and an automatic steak-broiler of 10.5 kw. by the same manufacturer. Two Electromatic tables equipped with Edison-Hotpoint hot-food pans keep food warm while standing ready to serve. Dry electric heat eliminates hot water which gives rise to humidity in the ordinary restaurant kitchen. Also, it maintains each food at its own best temperature for serving.

A "set-up" table keeps dishes warm, and an automatic Toastmaster roll-warmer keeps hard rolls hard and soft rolls soft while maintaining the right temperature for serving hot bread.

A complete section of the kitchen is set off for handling dishes. A 13-kw. Hobart dishwasher washes about 2,500 dishes per hour with above-standard sanitation by subjecting dishes to 190-F. water and steaming them dry.

Two large refrigerator rooms, one of which is equipped with a deep-freeze unit, using York equipment and rated at 15 kw., keep meat and produce at proper temperature. Also, an

---

SHRIMP, and the hot fat ready (top) in the three fry kettles behind them. Three heavy-duty ranges on the right

SMELL those hot pies (left) coming from the nine-year-year-old, double-deck bake oven. The single-deck oven and a custom built pastry range were installed in the recent modernization

Electric Cooking

ROY H. KNOX*
Advertising and Sales Promotion Mgr.
Birmingham Electric Co.,
Birmingham, Ala.

electric ice machine by York produces ice already chipped for beverages.

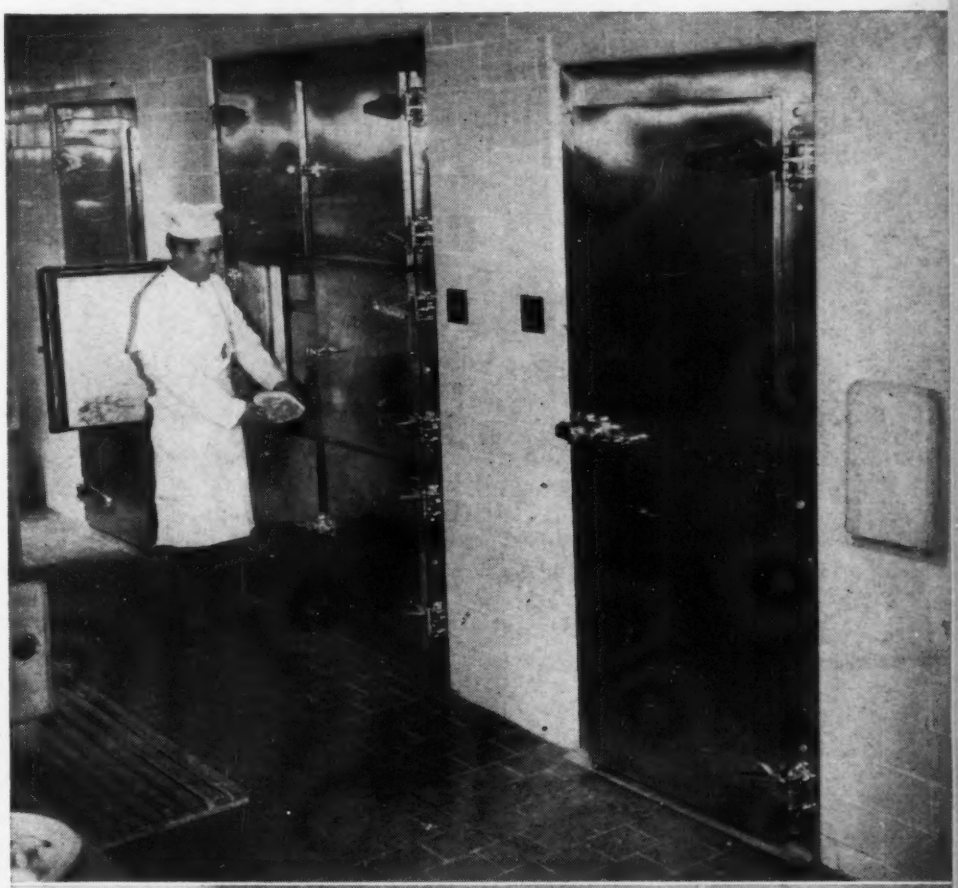
For 25 years, the owners of Joy Young have made their own baked goods. The new bakery, opening off the kitchen proper, has two automatic Edison-Hotpoint bake-ovens, a special-built pastry range by the same manufacturer, two electrically operated Hobart dough-mixers, and an electric pie-crust dough-roller. The bakery load is approximately 20 kw.

Both kitchen and bakery have ventilating fans and the dining area is air conditioned. Joy Young was the first restaurant in the state of Alabama to install air conditioning around 1935.

Lighting in kitchen and bakery gives approximately 35 foot-candles on all tasks. Large skylights afford auxiliary light to the system of recessed fluorescent lighting installed against the white background of the ceiling. The dining area makes use of indirect fixtures and recessed lens boxes. The lighting load is approximately 20 kw.

Nine years ago, Joy Young's owners, believing themselves to be experimenting, installed a Hotpoint double-deck bake-oven and an electric fry-kettle. In their own words they tell the story of how their new all-electric kitchen came into being: "About nine years ago, we bought an electric fry-kettle and a double-deck bake-oven. They held up fine. Our help didn't grumble about cleaning them because they are so easy to clean, not like other stoves. The help complained about heat and fumes from the other stoves, and they had to be repaired too much. Pretty soon —in four years—the other stoves wore out, but our electric fry-kettle and the electric bake-ovens held up and cooked like new. They look like new and we still use them. The electric bills are all right, too."

No accurate figures are available for showing the increase in business since Joy Young installed all-electric equipment. The restaurant has always done a good business, but its owners say there has been an appreciable increase in patronage since they reopened last fall.



LOOKS like a nice piece of ham, but the picture (top) was taken to show the refrigeration facilities, consisting of two walk-in cooling rooms and a food freezing unit

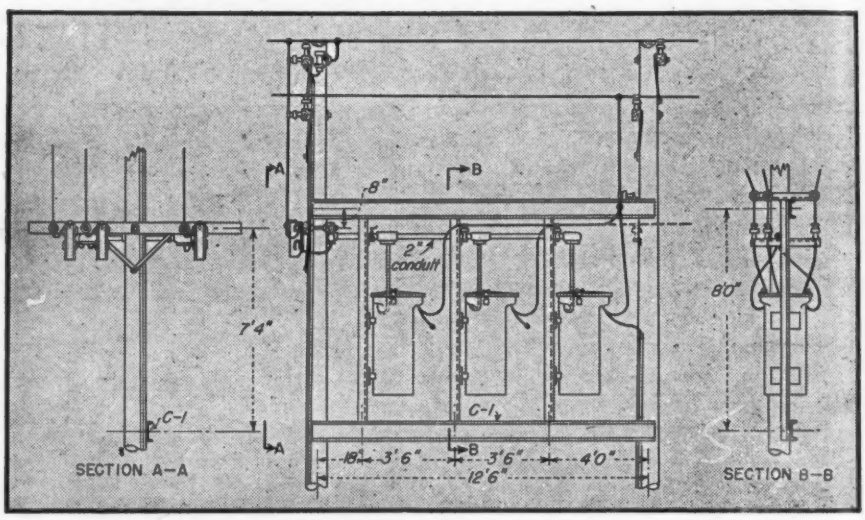
SMILES surround this dishwasher which, loaded up with dishes, washes them clean in two to three minutes (right)

HOW

DESIGN • CONSTRUCT • OPERATE • MAINTAIN

Three-Phase Bank Hung on Two-Pole Rack

W. P. HARRISON
Oklahoma Gas & Electric Co.
Oklahoma City, Okla.



HANGER BRACKETS and conduit streamline this rack for three 100-kva. transformers

SUSPENDING transformers by their mounting brackets has the advantage, compared to setting them on a platform, of simplifying and streamlining the installation. No further bracing is necessary for transformers as large as three 100 kva. As shown in the accompanying outline, the installation has no parts overhanging more than in the installation of a single-phase transformer.

Two channels, 8-in. by 11.5-lb. by 13-ft., are mounted between poles. Vertical angles, 4-in. by 4-in. by $\frac{3}{8}$-in. by 8-ft. 8-in., are used for transformer unit mounting. Plates are bolted to the transformer mounting brackets for bolting to the vertical angles.

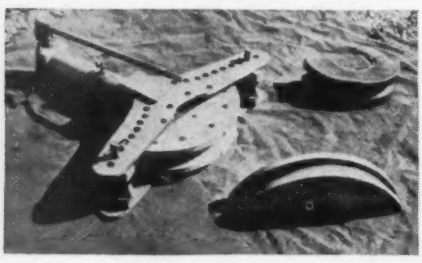
Primary wiring is carried in a short section of conduit above and down to the transformers and the secondaries are open wiring.

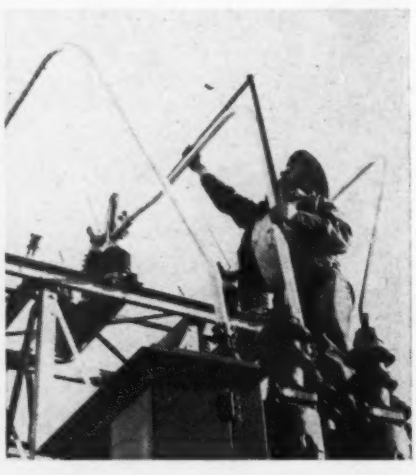
• • •

How to Bend Tubular Aluminum Bus

T. L. BOURBONNAIS, II
Electrical Engineer, Boise, Idaho

ALUMINUM TUBING is being used as bus to connect air-break switches, oil circuit breakers, transformers and other equipment at the new Boise Bench substation of the Idaho Power Co. Tubing in lengths up to 30 ft. of 1-in., $1\frac{1}{4}$-in., and $1\frac{1}{2}$-in., was used. To install the aluminum tubing, it was found that a special bending technique had to be developed. A solid-frame, Tal Prestal hydraulic bender as illustrated was used. Secret of making perfect bends was found to lie in applying a series of small bending forces throughout the area of the bend, rather than making the bend in one operation, as is done with conduit. Special attention had to be given to the shoes, also.





HYDRAULIC BENDER showing three special wood shoes for bending aluminum tubing. Measuring an angle (right) on 1¼-in. aluminum tubing bus; calipers were homemade, locked in position with the wrench

The operation is described as follows: Three special wood shoes are used on the movable cylinder. The 1-in. shoe is made of lignum vitae with an inside radius of $5\frac{1}{2}$ in. The other two shoes are of maple with an inside radius of 9 in. All shoes are solidly backed with steel, which is bored to fit the bender cylinder. The recess on the face of the shoe is half the diameter of the tubing in depth, and is a snug fit. The two stationary

shoes were ground very smooth on the surface where the tubing makes contact. The slightest irregularity in the casting will mar the tubing. A small film of grease on the shoes is a help.

Simply putting tubing in the bender and applying pressure will produce a badly kinked and ruptured bend. In using the method further described, 107 bends were made without spoiling a single length of tubing because of imperfect bends.

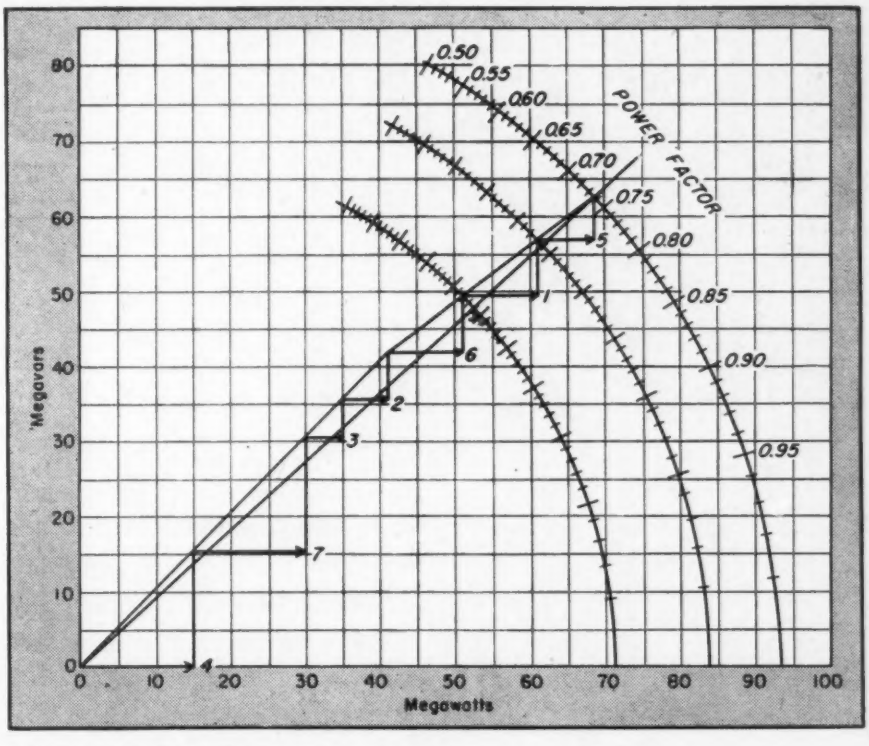
To make a 90-deg. bend in 1¼-in. or 1½-in. tubing, five 2-in. spaces are marked off on both sides of the center of the bend. The tube is placed in the bender and, after bringing the wood shoe snugly to the tube, about twelve strokes of the hydraulic pump will apply a 4-deg. bend to one of the outside marks. (Counting strokes was found to be the easiest method for an operator to control his work). The bender is then moved to the other end mark and twelve more strokes applied. From here on bending is alternated back and forth with three additional strokes applied to each mark on each side until the center is reached. That is, first twelve strokes, then 15, 18, 21, 24, giving the same number on each corresponding mark on either side of center. The bend is finished by applying pressure to the center mark. After the bend is brought to the proper angle, several additional strokes must be added, as the tubing has considerable resiliency.

For 1-in. tubing, three marks 1 in. apart are used. Six strokes are applied to each of the outside marks to produce 2 deg. of bend. The next two sets of marks receive 12 and 24 strokes as the center is approached where the bend is completed. If the bend is less than 90 deg., then less spaces are marked off and the number of strokes at each position is reduced. The stationary shoes are placed in the 3-in. conduit position when using the large wood shoes and in the 1½-in. position for the small shoe. During the bending, the metal on the outside of the bend can be seen to stretch, which is normal, but if the tubing starts to buckle away from the shoe, the bending must be stopped at once and the tubing moved to a new position at least an inch away.

• • •

One Way to Find Generator Reserve

EMMETT J. KEOUGH
Supervising Electrical Engineer
Iowa Electric Light and Power Co.
Cedar Rapids, Iowa



GENERATING CAPACITY at various power factors

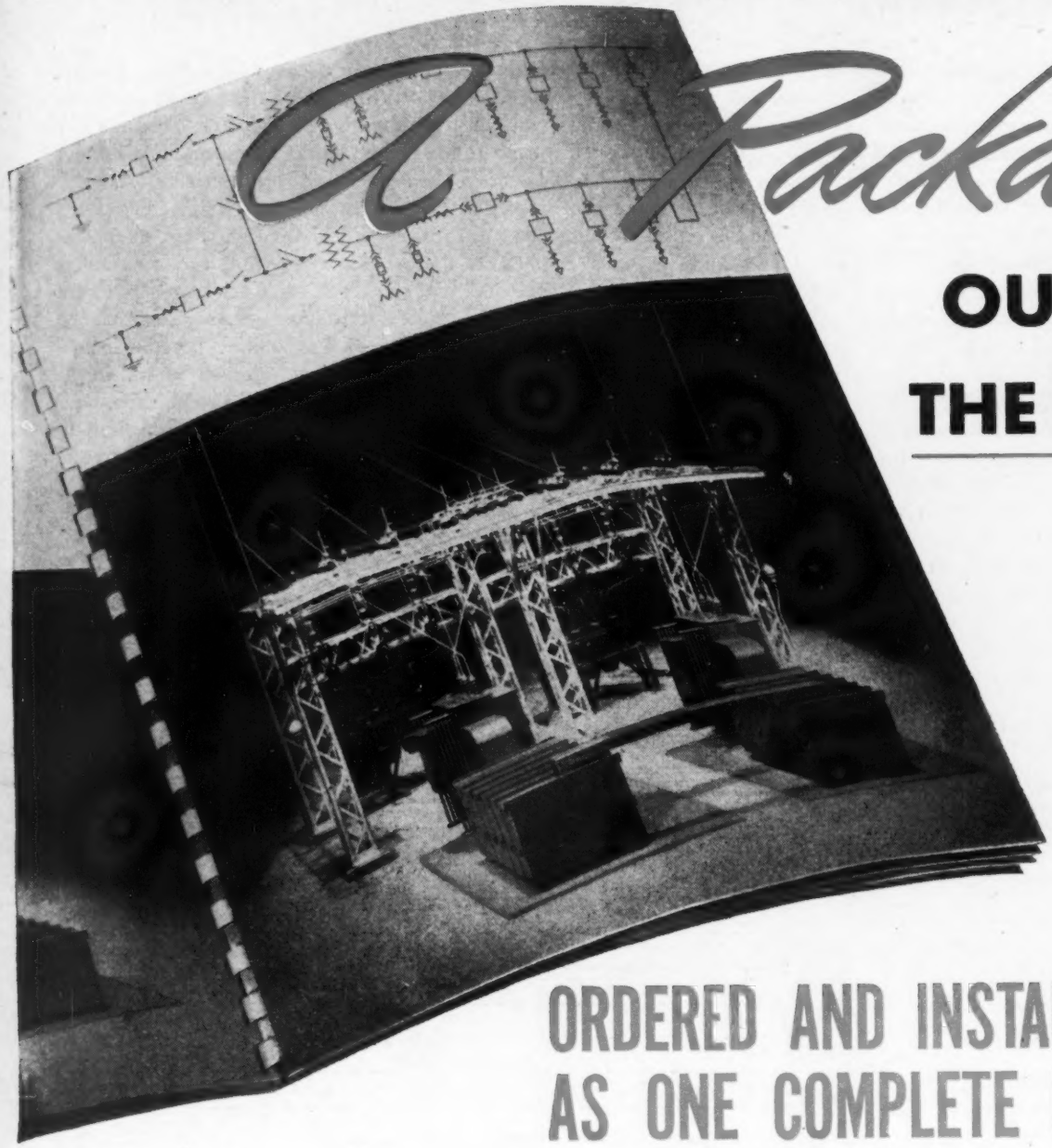
WITH POST-WAR LOADS at high levels and future expansion programs impeded by long delivery promises, those parties responsible for meeting these demands have a problem to "squeeze" capacity out of existing generating equipment if they are to meet the impending situations. The accompanying chart has been developed as an aid to uncover hidden reserve capacity and it can be used also as a power factor calculator.

The chart is constructed on the basis of generator ratings in the station, in this case as listed in Table 1. The ratings are added graphically in the order of their preference so that the less efficient machines can be omitted if desired. The power factor scale was developed from an arc including 100 units of the squared paper; then the intersecting point of each unit with this arc becomes a division on the power factor scale. The hypotenuse is constant (100) and the side adjacent varies (from 1 to 100); thus, each division of the side adjacent equals 1 percent power factor at the intersection.

Since War Time was abolished, the daily peak comes at a time when the power factor is high due to lighting and in the subject case varies from 90 to 97 percent. As listed in Table 2, over-all power factor was calculated from actual loads for each day during the heavy load periods. These calculations permit the requirements to be anticipated from day to day.

An example for the chart: With all units running, a power factor of 75 percent would limit the station output to 70 mw., but with an evening peak at an expected power factor as high as 96.7 percent, the station output could be increased to 90 mw.

The chart also serves as a practical power factor calculator. By adding a transparent scale pivoted at the 0-0 corner with the kva. to scale, problems relating to kva., kw., rkva. and p.f. can be solved with speed and



A Package OUT OF THE BOOK

ORDERED AND INSTALLED AS ONE COMPLETE UNIT

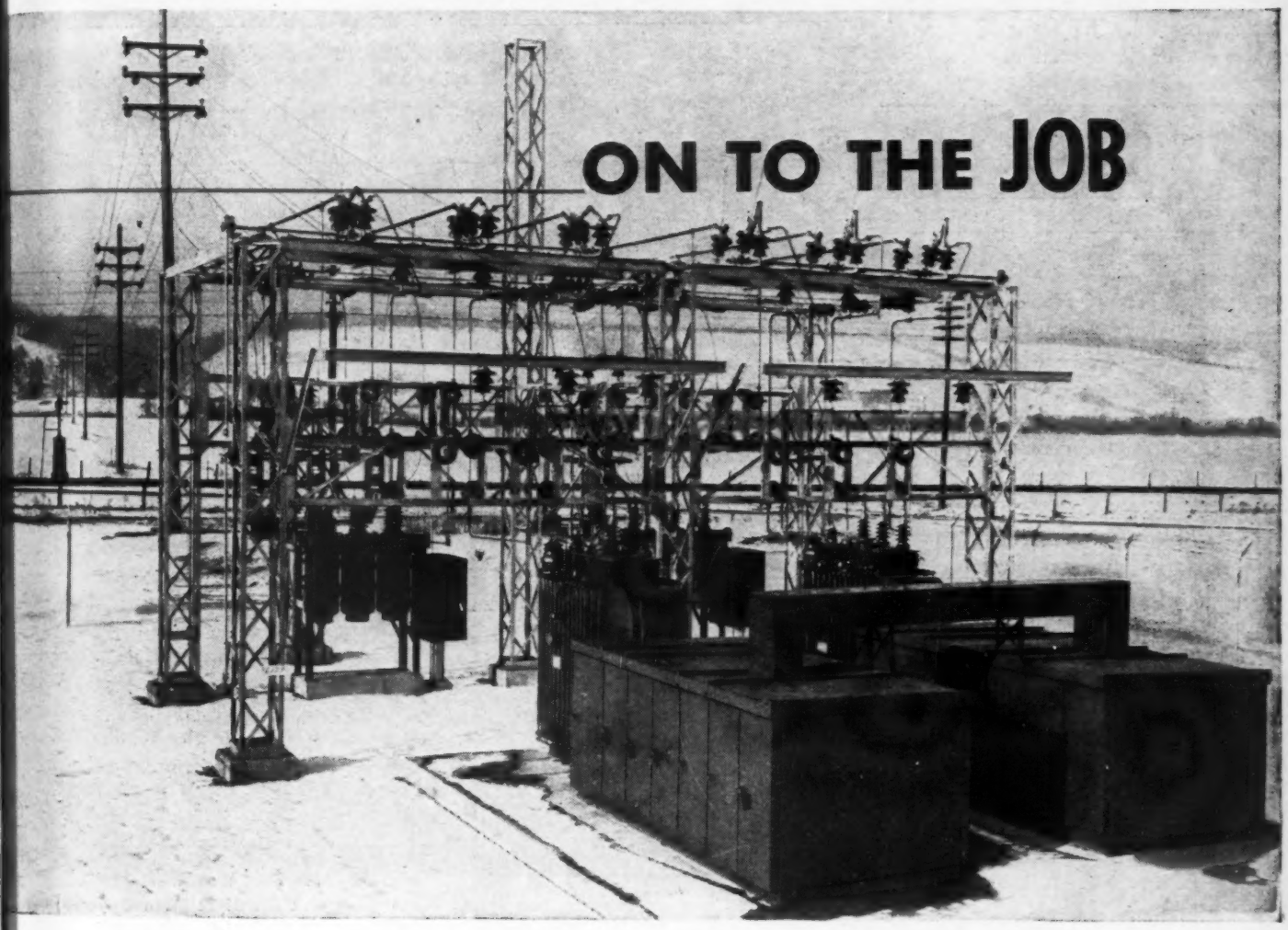
Only one order and one set of specifications were needed for all the equipment of the above substation. Transformers, switchgear, steelwork, lightning arresters, disconnects—everything but the conduit, foundations and enclosing fence—was ordered and installed as a unit.

SAVED TIME—CUT COSTS

This eliminated months of costly "piecemeal" planning—made it possible to place the order without delay. It made installation quick and easy too—the package substation was shipped in factory-assembled sections as large as shipping facilities permitted.

More and more utilities are finding it easy, economical and highly practical to select—from the hundreds of standard designs—a complete package substation matched to each specific job. They find it frees system engineers of much detail work on components, lets them concentrate more profitably on over-all system operations.

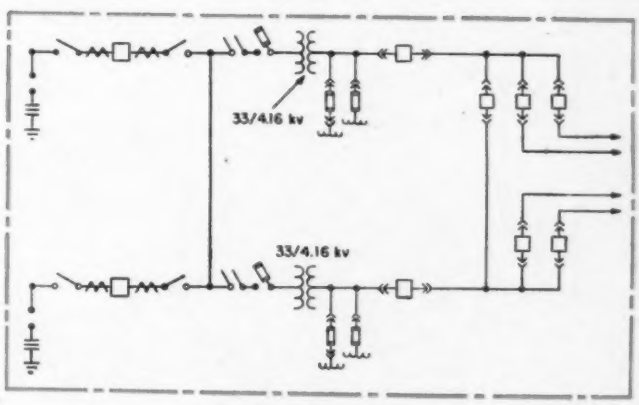
Substation . . .



AVE TIME AND MONEY WITH THE *UNIT APPROACH*
–GET THE COMPLETE SUBSTATION AS A *UNIT*.

Thirty of the basic package substation arrangements re shown in GEA-4500 (left, above). Use it to investiate the *unit approach* to your next substation applicaon. We think you'll be pleasantly surprised. Your G-E les representative will gladly provide a copy and lp you all he can. *Apparatus Dept., General Electric ompany, Schenectady 5, N. Y.*

PACKAGE SUBSTATION



GENERAL ELECTRIC

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accuracy. If on the transparent scale there is added a $\frac{1}{32}$-in. counter bore to each division, the point of a pencil can be inserted at the kva. value and the scale pivoted to the kw. and/or rkva. value. This fixes the kva. value and holds the reference until the other values are read. Because most practical problems have the kva. given, this speeds the operation.

TABLE 2—Usual Peak Values

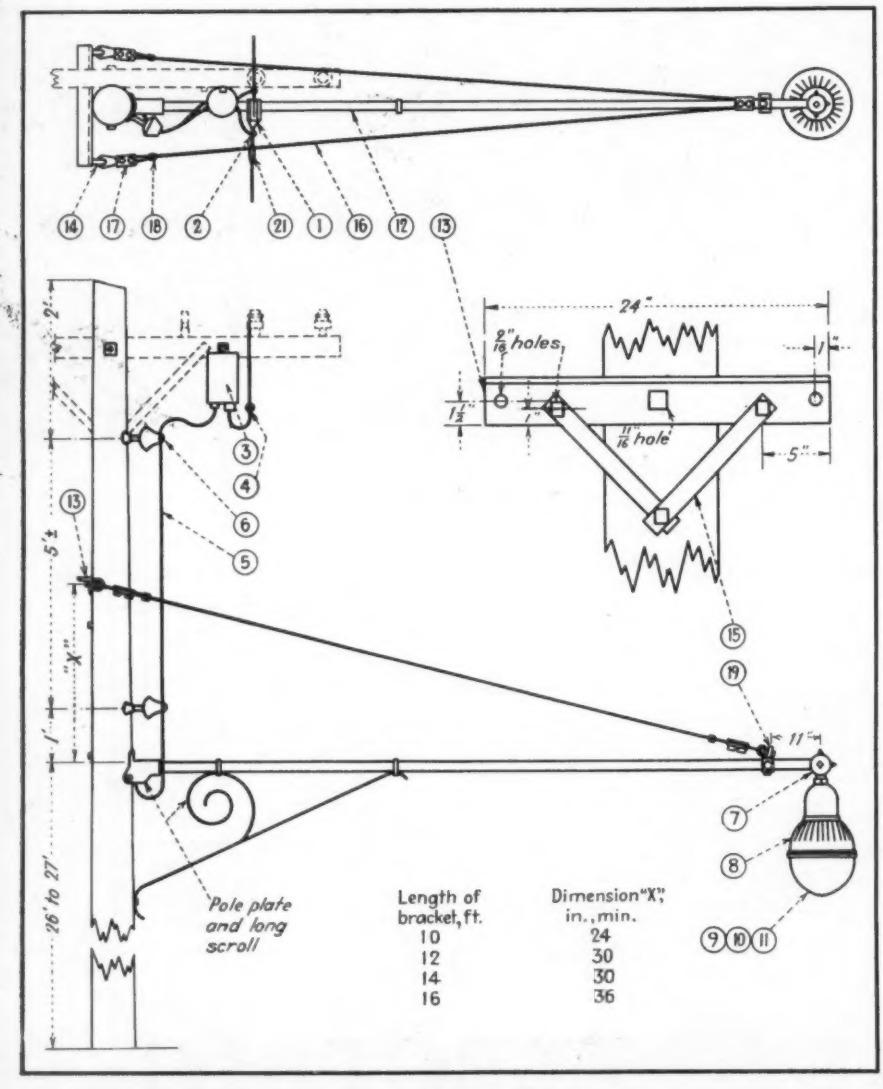
Day	A. M.		P. M.	
	P. F.	Mw.	P. F.	Mw.
Sunday	0.92	28	0.978	52
Monday	0.745	58	0.90	70
Tuesday	0.85	62	0.93	68
Wednesday	0.805	56	0 957	74
Thursday	0.90	63	0.96	72
Friday	0.895	56	0.95	65
Saturday	0.945	48	0 963	63

TABLE 1——Generators and Ratings

No.	Mw.	Kva.	P. F.	Kv.	Amp.
			Two-phase		
5	7.5	9,384	0.80	2.4	1,955
1	10.0	12,500	0.80	2.3	2,717
6	10.0	12,500	0.80	2.3	2,717
2	6.0	8,775	0.685	2.4	1,830
			Three-phase		
3	5.0	7,150	0.70	14.0	295
7	15.0	21,428	0.70	14.0	885
4	15.0	21,428	0.70	14.0	885

• • •

Unifying Street Light Mast Arm Construction



PLAN AND ELEVATIONS of mast arm for 6,000-lumen unit

THE United Illuminating Co., New Haven, Conn., has adopted uniform construction practice in regard to street light mast arms, as shown, and field work is much facilitated by the layout sheet and list of materials making up this standard. Bracket lengths range from 10 to 16 ft. in the 6,000-lumen unit set-up, and the heights of the mast arm may vary from 26 to 27 ft. above ground.

Principal Material Requirements of 6,000-Lumen Unit Mast Arm Layout

Item	Quan.	Description
1	1	Strain Insulator
2	2	No. 6 Connectors
3	1	I.L. Transformer
4	4	No. 8 Connectors
5	*	No. 8 Twin Cable, 600 volts
6	2	Duplex Brackets
7	1	Spiked Head
8	1	Luminaire
9	1	Series Socket
10	1	Film Cutout
11	1	Incandescent Lamp
12	1	Lamp Bracket
13	1	3 in. x 3 in. x ¼ in. x 24 in. L-Iron
14	3	½ in. x 4 in. Eye Bolts
15	1	X-Arm Brace
16	*	2.2M Guy Wire
17	3	2-Bolt Clamp (Small)
18	2	Serving Clips
19	1	Adjustable Brace Clip
20	1	No. 6 Line Splice

* Quantity as required.

BREAKERS INTERRUPTERS...

EASILY REMOVABLE FOR REDUCED MAINTENANCE

Improved, simplified construction of the new multibreak interrupters on the G-E type FK-439 breakers assures faster circuit interruption for greater system stability. Interrupting time of either 3 or 5 cycles (with 20-cycle reclosing) is obtained on all ratings and has been thoroughly proved by extensive field tests. With the new interrupter you get . . .

REDUCED MAINTENANCE

Long contact life because of arc-resisting materials . . . Ready access to the interrupters is provided by a larger manhole . . . Step rings inside the tank afford the operator secure footing.

QUICK INSPECTION

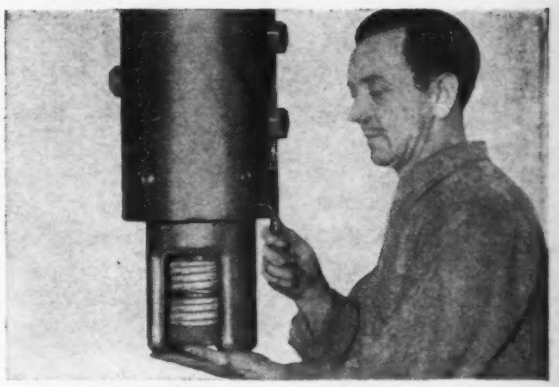
The entire interrupter is easily taken out, or the 17 lb contact element can be quickly removed for inspection. (Three-step disassembly at right.)

NEW DESIGN FEATURES

Lighter weight of the interrupter plus greater mechanical strength assures consistent performance under all operating conditions . . . A compact, built-in resistor eliminates destructive over-voltages . . . Shorter arc lengths and lower pressures mean greater margins for satisfactory performance.

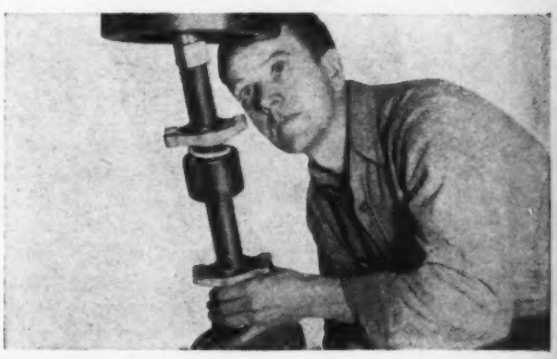
OTHER "439" ADVANTAGES

The FK-439 breaker also has completely sealed bushings which further reduce maintenance. High-speed reclosing is accomplished by the positive action of the pneumatic mechanism, while redesign has decreased the tank dimensions and overall unit weight. Your G-E sales representative has additional information on the "439" breaker, or write for bulletin GEA-4407. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*



First—Static shield is removed.

Second—Studs holding the removable contacts in position are taken out.



Third—Removable contact element is easily withdrawn for inspection.

GENERAL ELECTRIC

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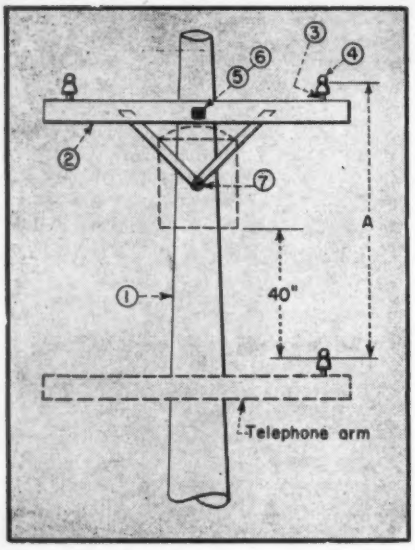
Rural Line Construction . . . I

An outline of materials and type of construction to be used for rural lines; an adaptation from standards of New England Power System. Guying, types of pins, insulators and conductors, sags and service drops will be presented in an ensuing issue



POLE FRAMING—Dimension A = Power wire 60 deg. final unloaded sag plus 2 ft., 6 in., but not less than 40 in.

MATERIAL LIST

Item	Quan.	Description
1	1	Pole
2	1	Crossarm, 4 pin
3	2	Insulator pin
4	2	Insulator
5	1	Through-bolt
6	2	Square washer
7	1	Lagscrew, 1/2 in. x 4 in.

FEATURES not covered shall conform to standard urban construction. The Standard should be modified, where necessary, in order to conform to rules of regulatory bodies having judisdiction.

"Rural lines" (by definition here) are electric distribution lines 7,200 volts maximum used to supply scattered customers, principally farms or small groups of customers in villages where the prospective load necessitates reduced costs.

Pole classes shall be chosen to provide the required strength for the wire loading and span lengths contemplated.

Table I shows the maximum spans (average of two adjacent spans) that can be carried on different classes of poles with the different wire loadings that may be expected. The maximum spans cannot be used except when the ground contour or pole height will provide the necessary clearance.

On joint construction the average span should not exceed 350 ft. with an occassional maximum span of 400 ft.

Pole replacements should be made in accordance with Pole Inspection Standard for requirements of the individual pole and in the event that unanticipated attachments are to be made on existing rural lines.

Table I—Maximum Tangent Span for Unguyed New Poles
(No Transformers or Service Drops)

	Number of Wires														
Power	2	3	4	2	2	2	2	3	3	3	3	4	4	4	4
Telephone	....	....	....	2	4	6	8	2	4	6	8	2	4	6	8
Pole Class															
9	500	330	260	...	...	...	...	...	...	...	...	...	...	...	...
7	650	430	330	390	280	220	180	300	230	180	150	250	200	170	140
6	...	550	420	...	360	280	230	380	290	230	200	320	250	210	180
5	...	...	520	...	...	350	280	...	360	290	250	400	320	270	230
Transformer*	60	40	30	35	25	20	20	25	20	20	20	25	20	20	20

* At transformer pole the above spans shall be reduced by the amount shown on this line.

Table II—Minimum Pole Height and Conductor Separation

	Min. Pole Height Above Ground, ft.		Min. Vert. Sep. between Power and Telephone Wires at Pole, in.	
Level Ground Span, ft.	Amerductor No. 6	Copperweld No. 6A	Amerductor No. 6	Copperweld No. 6A
200	20	20	40	40
250	21	21	44	44
300	23	23	56	58
350	25	26	70	78
400	28	30	89	114
450	29	32		
500	33	36		
550	37	41		
600	42	47		

Table III—Pole Lengths and Settings

Pole length and class, ft.—No.	25–7	30–7	30–6	30–5	35–7	35–6	35–5	40–6	40–5
Normal depth without keying, ft.-in.	4-0	4-0	5-0	5-0	4-6	5-0	5-0	5-0	5-0
Guyed pole well keyed along line, ft.-in.	3-6	3-6	3-10	4-0	3-10	4-0	4-4	4-4	4-6
Poles well keyed top and bottom or set in paved areas, ft.-in.	3-6	3-6	3-6	3-9	3-6	3-9	4-0	4-0	4-4

Pole Lengths. Poles shall be chosen to provide the necessary clearances above ground, and, in the case of jointly owned poles, the required separation, at the pole, between power wires and telephone cables or wires.

Minimum clearances above ground shall be: (1) For power wires, 18 ft. (2) For telephone wires, 14 ft.

Minimum separation at pole shall be: (1) Between power wire (750-8,700 volts) and telephone cable or wire—the power wire final sag at 60 deg. F., no wind plus 30 in., but not less than 40 in. (2) Between power wire (0-750 volts) and telephone cable or wire—the power wire final sag at 60 deg. F., no wind, but not less than 40 in. (3) Between transformer case and telephone cable or wire—40 in.

Table II shows the relation between level ground span length and minimum pole height above ground to provide the foregoing clearances and separations. It also shows minimum separation at the pole, between power and telephone conductors for those span lengths which may be jointly used.

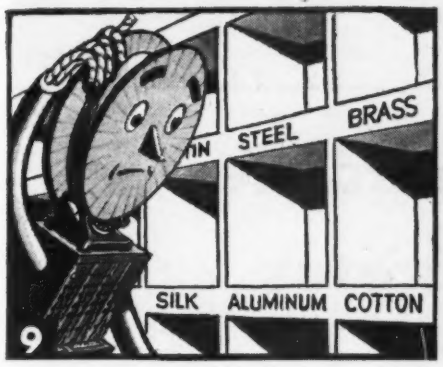
Pole Settings. Solely owned rural line poles should be set to depths not less than those shown in Table III. All poles should be well keyed top and bottom wherever suitable rock is available.

Joint owned poles shall be set in accordance with the prevailing practice under the joint ownership agreement.

In very soft or permanently wet ground deeper holes shall be dug when, in the judgment of the foreman, it seems necessary.

Nine inches of solid rock excavation shall be considered as equivalent to 12 in. of soil if the pole is well keyed in the hole.

Pole framing is illustrated, accompanied by a material list.

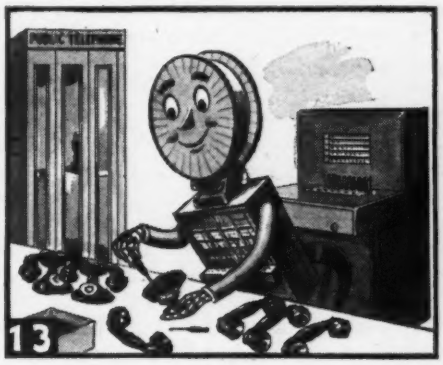


SUBSTITUTES GALORE were found for unobtainable materials. In one shop using 1340 different items of raw material, 950 substitutions were made in 9 months—as many as 4 for one item. Production mounted fast!

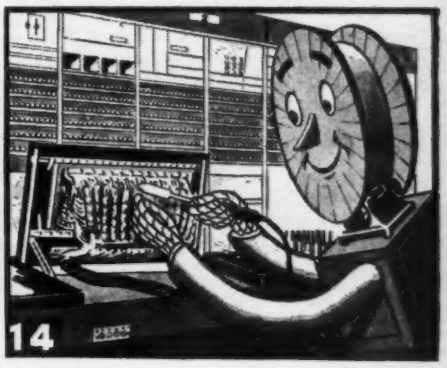
ENDLESS SLEUTHING FOUND SUPPLIES for Bell System. 1946 purchases, including raw materials, from 15,000 suppliers, ranged from pencils to telephone poles, precious metals to wood pulp, exceeded $250,000,000.

WORKING 'ROUND THE CLOCK got the most out of plant. In 1946 Western Electric delivered to the Bell Telephone Companies more apparatus, equipment and supplies than in any other year in its 77-year history.

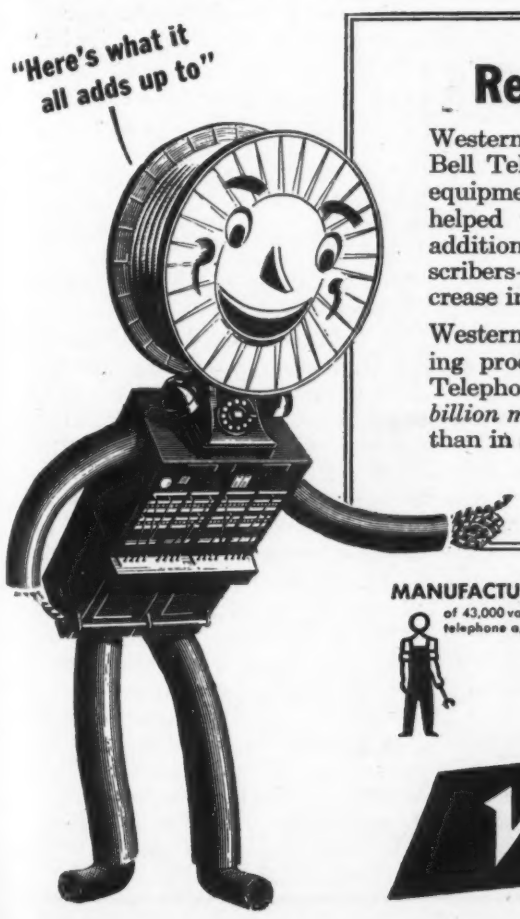
FROM COAST TO COAST, Western Electric's distributing force rushed to deliver equipment and supplies to the Bell System. Each of 29 distributing houses, across the nation, stocks some 10,000 different items.



REPAIRING WORN TELEPHONE EQUIPMENT has long been another job of the 29 distributing houses. The speed with which they put equipment back on its feet helped in meeting record telephone demands—*faster!*



INSTALLING CENTRAL OFFICE SWITCHBOARDS and equipment in some 1200 localities monthly kept Western Electric's installation crews busy in '46. Thousands trained in this specialized work. Force is now 25,000.



Results in '46

Western Electric furnished the Bell Telephone Companies with equipment and supplies which helped them provide 3,264,000 additional telephones to subscribers—more than twice the increase in any previous year.

Western Electric's record-breaking production helped the Bell Telephone Companies handle 7 *billion more* telephone calls in '46 than in any previous year.

Outlook for '47

Western Electric schedules call for far greater production in '47—for such enormous amounts of equipment as:

Dial exchange equipment to handle, when installed, 2,222,000 additional lines;

8410 manual switchboard positions;

Nearly 4,000,000 telephones;

Telephone cable of all types containing over 49 billion feet of wire.

This tremendous output in '47 will go a long way to help the Bell Telephone Companies meet the nation's unprecedented demands for telephone service.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

A Guide for Obtaining Clearances on Lines and Station Apparatus

An adaptation on procedure from the Safety Rules of Portland General Electric Co., Portland, Ore.

WHEN lines or equipment are taken out of service in order to work on them, all operations must be handled strictly in accordance with the rules for obtaining clearances issued by the operating department, entitled. "Rules for Obtaining Clearances on Lines and Station Apparatus." Only competent employees familiar with clearance rules and circuits or apparatus involved shall handle clearances.

Each employee shall thoroughly familiarize himself with these rules and adhere strictly hereto except in emergencies, to save life or property.

Each employee shall check the precautions taken to insure that the equipment on which he is to work is "dead."

Rules for Obtaining Clearances on Lines and Station Apparatus

Switching clearances shall be given and handled in the order and manner prescribed as follows:

In order that there may be the least possible chance for a misunderstanding in the matter of switching, extreme care must be observed by all parties who have to do with switching operations. Accordingly, the following rules shall be followed:

(1) The department desiring a shutdown shall use form (No.) . . .. in duplicate for each line or piece of apparatus to be shut down.

Both copies are to be sent to the load dispatcher. Load dispatcher shall check load, switching, customer notification, and other conditions that may affect the particular line or apparatus to be out, and return one copy with O. K. to the department originating order.

If more than one line or piece of apparatus is to be shut down for the same job, notation shall be made on all orders calling attention to this job.

(2) The following words shall be used when requesting a clearance:

"This is (name) . . . .requesting line No. . . . . to be shut down as per order No. . . . . ."

The load dispatcher shall check this request with his copy and repeat back for an O. K. After there is a complete agreement between the load dispatcher and person requesting clearance, the load dispatcher shall proceed to have necessary switches opened and tagged.

(3) After switches have been opened and tagged, the load dispatcher shall report as follows:

"Switches on . . . . . .have been opened and tagged for . . . . . ."

In addition he shall report switches cleared at each station and each pole switch by number, and report if line has or has not been grounded at station. The person requesting clearance shall note the switches opened as reported and repeat back for an O. K. If O. K.'d by the load dispatcher, the person requesting clearance shall consider the line his until he personally reports clear to the load dispatcher.

(4) When a line, or apparatus, must be taken out of service for emergency maintenance, or when a line has kicked out due to some fault, the line or apparatus must be properly cleared and tagged as outlined above.

(5) When it is impossible to talk directly to the foreman or lineman, the line or apparatus shall first be cleared and tagged for the station operator, or some person who may act for the load dispatcher. The station operator or other person shall then tag the line or apparatus for the foreman or lineman in charge of work to be done, and he shall be responsible for giving and receiving proper clearances with the foreman or lineman. After receiving proper clearance from the foreman or lineman, the station operator, or other person, shall then give clearance to the load dispatcher and proceed with switching as instructed.

(6) No clearance shall be given to anyone until all switches have been properly tagged.

(7) Anyone working on a section of line that cannot be protected by tags in a station should be sure that all pole-top switches controlling that section of the line are properly cleared and tagged for him.

(8) Only the load dispatcher shall have authority to order switching on 57-kv. lines or apparatus, or on such other lines or apparatus that may affect the system. Local feeders may be operated by the station operator, and recorded on the station log. Any interruption due to trouble on lines or apparatus shall be reported to the load dispatcher.

(9) When work has been completed, line or apparatus shall be cleared as follows:

"This is (Name) . . . . . .on shutdown order No. . . . . .I am clear of line No. . . . . .and have all grounds removed."

Load dispatcher shall repeat back and obtain an O. K.

The load dispatcher shall be informed of work done, or any changes that may affect the line or conditions under which it may have to operate. Sufficient information should be given for the load dispatcher to become familiar with the nature of the work done, but no unnecessary conversation should be carried on. Above all, everyone concerned should be absolutely sure that any conversation has only the meaning that is intended.

(10) In case an oil switch is in bad order, it may be necessary to operate it for test. If it has been tagged, the disconnecting switches on each side of the oil switch shall be tagged and then the tags on the oil switch removed. In no case shall the load dispatcher allow an oil switch that is tagged to be closed.

When You Hang a Wagner RURAL LINE TRANSFORMER

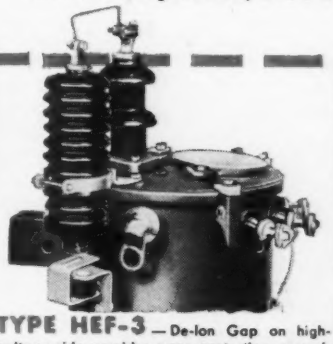
You Provide Dependable Continuous Service!

Wagner Rural Line Transformers have established enviable records in providing dependable performance. They are built by a company whose engineers have more than a half century of experience in building transformers, and incorporate features that assure dependable, continuous service.

Get performance plus protection by selecting the type that meets your requirements from Wagner's complete line of Rural Line Transformers.

Remember, Wagner has a nationwide organization to provide fast, convenient service, with 29 branches located in principal cities ready to help you with your transformer problems.

For full information on Wagner Rural Line Transformers write for Bulletin TU-1C, addressing your request to Wagner Electric Corporation, 6456 Plymouth Ave., St. Louis 14, Mo.



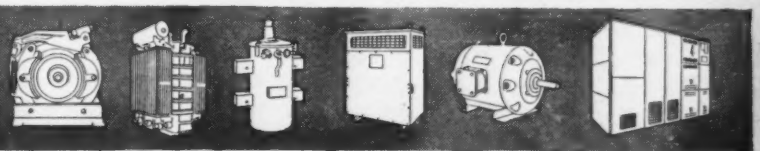
TYPE HEF—Wagner Conventional Rural-Line Transformer. Also available with protective fuse in the high-voltage bushing, or with a protective fuse and double gap.

TYPE HEF-3—De-Ion Gap on high-voltage side provides surge protection; secondary circuit-breaker protects transformer against secondary short-circuits and overloads. Breaker reset handle is easily accessible; on sizes 5-kva and above, a warning signal light is built into the reset handle.

TYPE HEF-5—Double "bird-proof" gap provides surge protection; internal fuse forms a protective link between the transformer and the high-voltage line. When the double gap and internal fuse are combined no other surge protection or transformer fuses are required.

Consult Wagner Engineers on All Transformer Problems

Wagner Electric Corporation
EST. 1891



T47-17

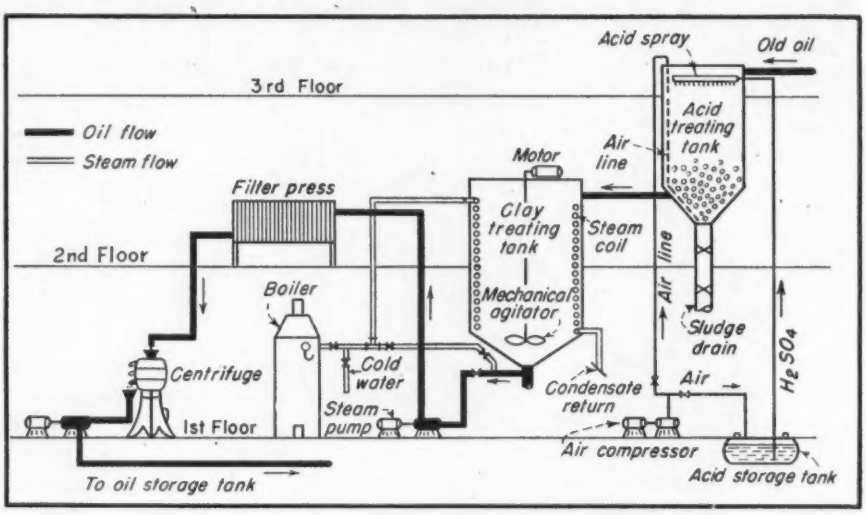
BRIDGE BRAKES • POWER AND DISTRIBUTION TRANSFORMERS • MOTORS • UNIT SUBSTATIONS

ELECTRICAL AND AUTOMOTIVE PRODUCTS

Transformer Oil Reconditioned for 7 Cents a Gallon

H. A. TYNAN
Test Engineer
City Public Service Board
San Antonio, Tex.

COMPLETE reconditioning of transformer oil requires acid and clay treatment in addition to the usual filter and centrifuge operation. Facilities for this work have been combined in one plant arranged for minimum attendance and maximum speed of treatment, in the arrangement illustrated. About 600 gal. per day, at a cost of seven cents per gallon and an over-all loss of only 6 to 8 percent, is the average record in this plant.



OIL RECONDITIONING PLANT combines acid treatment, clay treatment, filter and centrifuge in 600-gal.-per-day operation

Oil is pumped from the old oil storage tank to the acid treating tank. Approximately 0.05 gal. of sulphuric acid is added per gallon of oil. It is forced from the acid storage tank to the acid spray by compressed air and at the same time the oil is agitated vigorously by means of compressed air. This process requires about one hour after the acid has been added. The oil is then allowed to stand about 16 hours to allow sludge to settle in the tank.

The sludge is drained off slowly and the oil then passes into the clay treating tank. Approximately 0.75 lb. of No. 1 Millwhite clay is added per gallon of oil. The mixture is agitated mechanically and is heated by a steam coil at the same time. As soon as the maximum temperature of 275 deg. F. is reached, the oil is agitated by live steam. The vapor is drawn off by a blower. This stage of the process requires about one hour with temperature held at 275 deg. The oil and clay mixture is then cooled to about 140 deg. F. by passing water through the steam coil.

Filtering through the press removes the clay and moisture is removed in the centrifuge. This reconditioned oil is then pumped into the new oil storage tank.

Following is the record of one typical batch of oil—

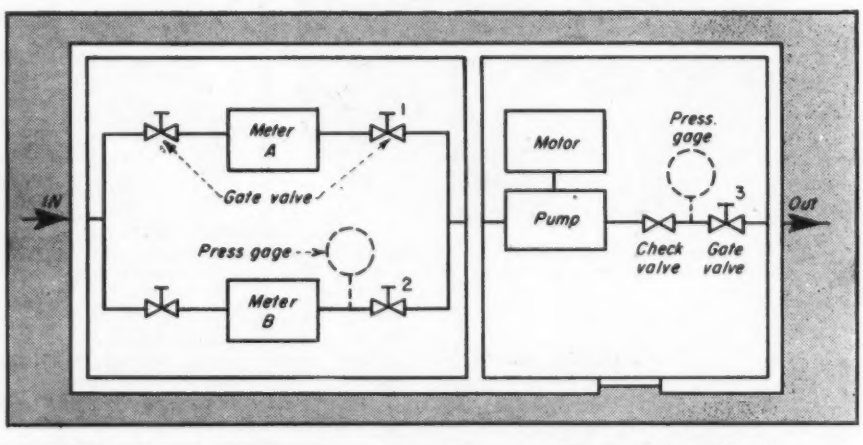
631 gal. old oil to 590 gal. reconditioned oil		
Tests	Before	After
kv.	19.5	25 plus
P.F.	1.77	0.216
KOH	0.846	0.023
Color	5	1.5

• • •

Impeller Change Brings Lower Electric Costs

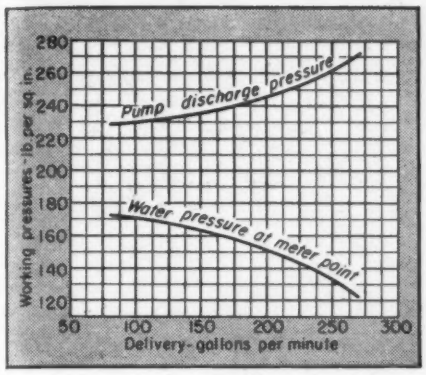
ALEX E. HUNTER
Utilization Representative
Duquesne Light Co.
Pittsburgh, Pa.

USE of a smaller impeller has improved the economics of a water booster-pump and brought about an attractive reduction in its operating cost for a small community served by the Duquesne Light Co. Water is supplied by a utility to a Water Authority which operates a 3,550-rpm. two-stage centrifugal pump direct driven by a 40-hp. squirrel-cage induction motor equipped with a push-button magnetic starter, a 250,000-gal. receiver and distribution mains consisting of 17,000 ft. of 6-in. pipe and 4,000 ft. of 8-in. pipe.



BOOSTER water pump station. For test purposes amount of water delivered by the pump was regulated by valves 1 and 2 on the suction side

A spot check of the water meters showed that the booster pump designed to deliver 200 gpm. against a total dynamic head of 393 ft. was actually delivering about 270 gpm. This condition led the author to suspect that the suction pressure was



PRESSURE-DELIVERY curves for centrifugal pump

higher and/or the discharge pressure lower than those on which the original design was based.

Pressure gages were installed as shown in the sketch and pumping conditions were studied with the data plotted as shown by the pressure-discharge curves above. It is apparent that a decrease in pump delivery results in an increase in water pressure at the utility's meters and a decrease in discharge pressure of the pump; the reason—decreased delivery means reduced water velocity and lower velocity means less friction loss.

Data from the curves give results as shown in the table. It will be noted that a decrease of water delivery rate from 270 to 190 gpm. or 29.6 percent resulted in a decrease in net head from 346 to 208 ft. or 40 percent and a decrease in water horsepower from 23.60 to 9.98 or 57.7 percent.

Pump Operating Data, with Original Impeller

Pump Delivery, gpm.	Water Pressure at Meter, lb./sq. in.	Pump Discharge Pressure, lb./sq. in.	Net Head		Water Horsepower gpm. × 8.33 × ft. 33,000
			lb./sq. in.	ft.	
270	122	272	150	346	23.60
190	154	244	90	208	9.98

Using the test data, the pump manufacturer advised that the impeller could be cut down in a local shop in about 6 hr., so as to give a delivery of 190 gpm. (which is more than ample for the existing needs) against a 208-ft. net head, with a resulting mechanical efficiency of about 63 percent and a required brake horsepower of only 15.7. However, the Water Authority decided to purchase a new impeller costing approximately $65, less installation, to meet the new conditions. The original impeller was retained for possible rapid reconversion to the original setup.

Under the plan of operation suggested by the electric power company, the pump is run an extra day each week, and a time clock, costing less than $20, was installed to start and stop the pump. Now the operator travels to the pump only for periodic inspections and maintenance.

During the first full month of operation with the new impeller, the charge for electric service dropped 30 percent even though the community used 20 percent more water than average. Thus, the cost of the new impeller was saved in about two months. This saving in power cost is partly due to a decrease in kilowatt-hours used, but mainly due to an almost 50 percent reduction in power demand and correspondingly improved load factor.

• • •

An ELECTRICAL WORLD *Comparison of Practice*

Transformer Load Estimates—A Summary of Methods . . . III*

TESTS and surveys of residential load characteristics, needed for transformer estimating factors, are also essential in commercial and rate studies, and most interest in estimating appears where there are active programs for load promotion in ranges and other large appliances. Load estimating has been proven as reliable as short-time field testing, which is limited to a few minutes' spot test or a few hours or days with a recording device.

Main questions with field tests are in relating measured load values at one time with maximum loads which may occur at another time. On the other hand, monthly kw.-hr. records provide information reflecting actual loads during all months of the year and give accurate data on increases as they occur, when they are interpreted in an estimating procedure.

The methods which have been reviewed in two previous articles may be considered by their use in four general procedure groups.

1. Direct kw.-hr. method. Customer meter readings for maximum months or annual total are transferred to the transformer cards. Tabulations or charts are then used for interpretation of kw.-hr. into diversified kw. demand for a group of services.

2. Classification by kw.-hr. Bands of kw.-hr. values are set up on the estimating chart and the billing records are then reviewed periodically for increases that move individual services into higher brackets.

3. Classification of services. Map records of secondaries are marked with size or class of house, with indication of two-wire or three-wire service and with known range installations.

4. Simple count of services and ranges. A constant value of demand for lights and small appliances may be used for all services in a general area, with the only variation being the record of a range installation.

Transfer of meter records to transformer records involves the most work, of course, since data by addresses in one department must be tabulated by groups in another department. Review of the meter records for classification simplifies this routine and probably does not impair the practical value. Count or classification of services is much the simplest method, and where ranges are in extensive use and changes are carefully

* Concludes a series published in ELECTRICAL WORLD, issues of May 24, page 132, and June 7, page 118.

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SPLICING SLEEVES

FOR LARGE CONDUCTORS AND HIGH-STRENGTH STRANDS

Light in weight—Holds full strength of conductor—
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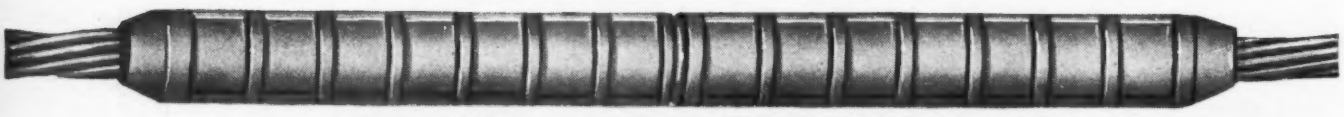

Completed Nicopress Splice on 3/8" Extra High Strength
Galvanized Steel Strand

THE NATIONAL TELEPHONE SUPPLY COMPANY

The National

5100 SUPERIOR AVENUE

Canadian Mfr.: N. SLATER CO., LTD., HAMILTON, ONTARIO, CANADA

SLEEVES for LARGE CONDUCTOR & STATIC WIRE SPLICING

Nicopress No. 635
HYDRAULIC TOOL

FOR INSTALLATION OF NICOPRESS SLEEVES ON LARGE CONDUCTORS AND HIGH-STRENGTH STRANDS

The Nicopress No. 635 Hydraulic Tool, with interchangeable dies, covers a wide range of large conductors in copper, copperweld, A.C.S.R. and Steel. This portable tool has ample capacity (35 tons) to easily compress full strength Nicopress Sleeves on all grades of strand, including Extra High Strength.

Telephone Supply Company

CLEVELAND 3, OHIO

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recorded, the method may be adequate. Such simplification can not, however, give any data on other increases.

Several ingenious charts, nomograms and estimating procedures have been set up for routine use. Some of them have been plotted from extensive test data and the results subjected to modification by further comparison with field measurements, while others are built on only a few base factors.

As noted previously, the final charts may also vary in giving: (1) demand expected for the conditions shown, or (2) transformer rating required with allowance for growth before change, or (3) minimum rating, with indication that a change is needed at the value shown on the chart. An estimating chart that is quite reliable for one set of conditions may therefore not be directly applicable for another situation.

Possible economies and the reliability of estimating from records appear to justify careful analysis and further efforts to find a clearcut and universal answer. With growth of loads, greater diversity and a wider range of possible characteristics, the effective load becomes harder to estimate by rough approximations. Additional developments of this nature may therefore be expected.

Summary of Factors in Transformer Load Estimating

1—Base of residence use is 1,000 kw.-hr. per year for three or four rooms with lights, refrigerator and small appliances.

2—Upper band of use is 2,000 kw.-hr. per year. Some tests show uniform addition per room use above the base.

3—Demand and consumption above the base increase in direct proportion—load factor is in general constant.

4—Use of a constant value of demand per service, or varying with diversity alone, is not reliable because of (3).

5—Electric ranges add about 1,000 kw.-hr. per year, and:
(a) add 50 percent more than double the demand of base use—load factor is decreased.
(b) shift time of maximum demand.

6—Because of the time variable, spot load tests are not reliable when a small percentage of services include ranges.

7—With very high saturation of ranges in any group, an estimate of their demand establishes transformer size.

8—Water heater control and rating practices vary too much for use of average factors of demand and diversity such as apply for ranges.

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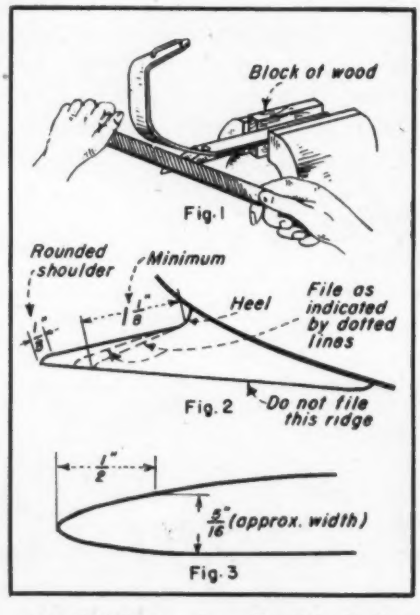
How One Company Maintains Pole Gaffs



SHARPENING pole gaffs: (1) climber set in vise; (2) and (3) dimensions for filing

ACCOMPANYING general instructions for sharpening pole gaffs are an adaptation from Work Method Standards, issued by the Transmission and Distribution Department of Boston Edison Co.

1. Use a clean, sharp, 10-in., second cut mill file equipped with a suitable handle.

2. Set the climber in a vise with the *underside* or *inside* surface of the gaff up, as shown in Fig. 1.

3. Place a small block of wood between one edge of the leg iron and the face of one of the vise jaws to compensate for any taper of the leg iron.

4. File across and toward the point on the *inside* surface (now facing up) between the heel and the point, holding the file flat on the surface with firm, steady pressure on the

VENTILATED *Copper Angle Bus* provides Maximum Heat Dissipation

WHEN ANGLE SQUARE HOLLOW BUSSES are installed with surfaces at 45 degrees to the horizontal, a streamline effect is obtained in air movement around the angles. Rate of heat dissipation is thus increased, and correspondingly greater current density is achieved.

This factor, however, is but one of many which must be considered in selecting the most effective bus conductor shape. Location, space requirements or current characteristics may dictate the use of bars, tubes, channels or cables.

Regardless of *shape* decided on, the *metal* to use is *copper*. Combining high thermal and electrical conductivity with strength, toughness and corrosion resistance, copper is generally recognized as the most satisfactory bus material.

Anaconda Copper Bus Conductors are furnished in any of the shapes listed. For detailed information, consult our Technical Department, or write for Publication C-25. 47191

BARS require minimum space, may be bent or twisted, connected to apparatus without special joint preparation and in laminated construction have unlimited d.c. capacity.

TUBES provide the highest bus conductor efficiency at a.c. frequencies, have greater rigidity, and may be oil or water cooled.

CHANNELS have large surface area, reduce temperature rise, provide greater rigidity than tubes for long runs and have flat surfaces for tap-off.

ANGLES for ventilated hollow busses have highest rate of heat dissipation, handle greater current density, but require more space for installation.

CABLES solve many problems in conducting extremely heavy currents in confined space or in connecting moving apparatus such as furnaces of the arc or resistance types.

ANACONDA
from mine to consumer

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BUS CONDUCTORS

THE AMERICAN BRASS COMPANY
General Offices: Waterbury 88, Connecticut
Subsidiary of Anaconda Copper Mining Company
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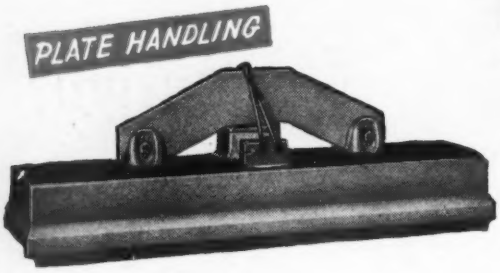
EC&M Magnets give a LIFT wherever needed

a size and type for every need

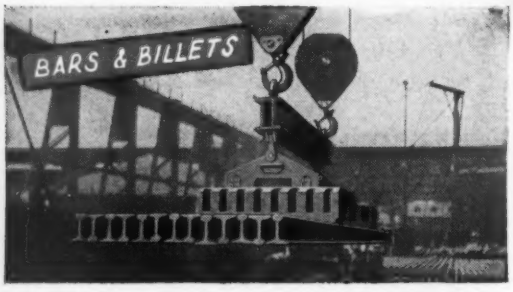
For odd jobs, specific jobs, and heavy, continuous duty applications — for your every requirement—we offer you the right size and type of magnet. Throughout nearly 50 years, we have built magnets to improve operations and reduce handling costs in foundries, steel mills, scrap yards, warehouses, and other places.

For heavy duty service such as handling scrap, pig iron, and nail kegs on a tonnage basis—Type SW All-Welded Circular Magnets. Streamlined design—high lifting capacity—watertight coil within a watertight housing. Bulletin 900.



For specific applications—used singly, in duplicate, or in triplicate on a spreader beam for long plates or other materials—Types P & F Rectangular Magnets. Sturdy, dependable, low maintenance. Bulletin 903.

For reaching into corners of plants and railroad cars, between machines and through narrow aisles—Type R Circular Magnets can be mounted on crane trucks making mobile units. Supplied in five sizes. The 29-inch diameter magnet, shown, receives 36-volt power directly from the truck. Sizes are available for all types and makes of crane trucks. Bulletin 904.



For hot or cold billet and rail handling—Type BR Magnets with circular-wound coils assuring great strength and high magnetic efficiency, also free circulation of air around coils. Bulletin 901.

Use the following coupon in sending for helpful literature on magnets suited to your needs.

THE ELECTRIC CONTROLLER & MFG. CO.,
2690 East 79th Street **Cleveland 4, Ohio**

Please send me Bulletin ☐ 900 ☐ 901 ☐ 903 ☐ 904

Name.....

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forward stroke, raising it on the back stroke. Keep the file clean to avoid scoring the gaff steel.

5. Keep the entire surface flat and straight except at the point. Start $\frac{1}{8}$ in. back from the point and rotate the file slightly to round the surface into a shoulder toward the point. See Fig. 2.

6. The width of the filed surface $\frac{1}{2}$ in. back from the point should measure approximately $\frac{5}{16}$ in. (Fig. 3).

7. Remove only sufficient material to obtain a good point. Do not make a needle point.

8. The *outside* shape of the gaff should not be materially changed and ordinarily very little filing on this portion is necessary after the *inside* surface has been sufficiently filed. If it is necessary to remove any metal to obtain the proper width, be careful not to file the outside ridge or round off toward the point.

9. When the length of gaffs wears to $1\frac{1}{2}$ in. measured on the *inside* from the heel to the point (See Fig. 2), the climbers should be regaffed or a new pair obtained.

These details are practically identical with the recommendations in a recently published field manual, "The Use and Care of Pole Climbing Equipment," which was prepared by the Accident Prevention Committee of Edison Electric Institute.

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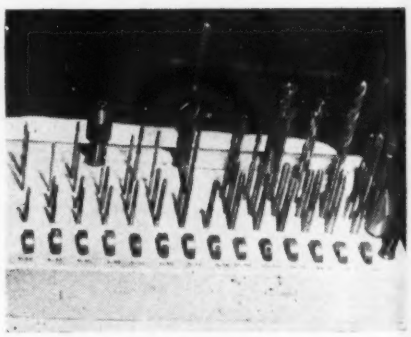
Drills and Die Set For Meter Work



HANDY tap, drill and die set containing all necessary sizes and threads required in meter shop work is shown. Clearance drill, tapping drill, bottoming tap, regular tap, and die are arranged as shown, so that for any given size all tools are in rows crosswise of the board. Also, there is provided retaining spaces for tap and die wrenches, end mill, countersink and several special taps. With this convenient set metermen lose no time in referring to tables and hunting through drill stands or boxes to find the right sizes of drills taps and dies

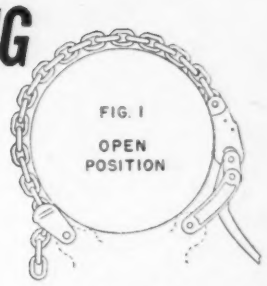
New CHANCE *Aluminum Fitted* HOT LINE TOOLS

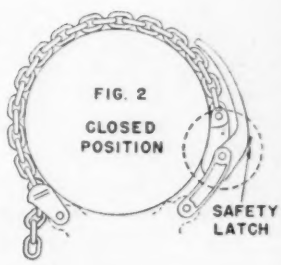
have this . . .

EASY to APPLY, SAFE LOCKING CHAIN TIGHTENER

Now all Chance Hot Line Tools, which are designed for attachment to poles, are equipped with a new light weight chain tightener that can be quickly secured to the pole by a lever operation and is latched with a specially designed safety catch. Except for the small safety latch trigger, connecting bolts, and the chain, the metal parts are made of aluminum alloy and then heat treated to give them added strength. These aluminum parts have been tested and proved to be considerably stronger than the high-strength steel loading chain which has a breaking load in excess of 6000 pounds. The use of aluminum reduces the weight linemen are required to handle on the pole. The lever operation makes application of the chain tightener much easier and faster than the old screw take-up method.

The illustrations at right show the steps of application. First, the chain is wrapped around the pole and engaged in the chain socket while the tightening lever is in open position. (Fig. 1) To tighten, the lever is moved to closed position (Fig. 2) and the safety catch automatically latches. If chain is too loose, the tightener may be released and the chain taken up a link in the chain socket, or a half link adjustment can be made in the take up. (Fig. 3) It is necessary to depress the safety latch and at the same time pull the lever as suggested in the lower photograph in order to release the tightener. Thus, there is no danger of a lineman accidentally loosening the tightener.





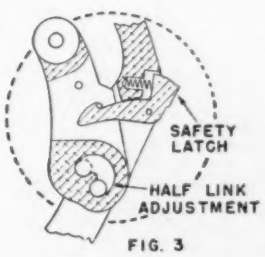
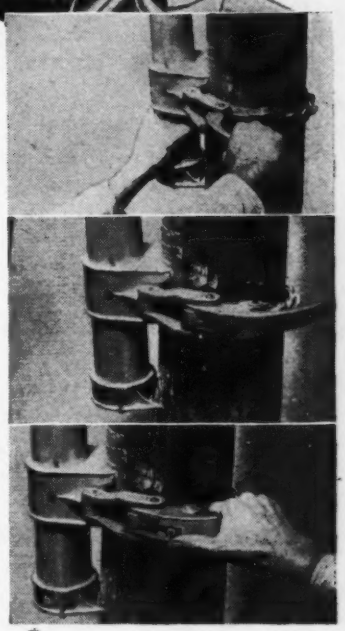


FIG. 3



- **Speed in attaching equipment to poles.**
- **Light weight.**
- **Over toggle latching that holds handle in closed position.**
- **Safety catch to prevent accidental unlatching.**
- **Each unit checked for proper latching before shipment.**
- **Metal Fittings are X-ray inspected.**

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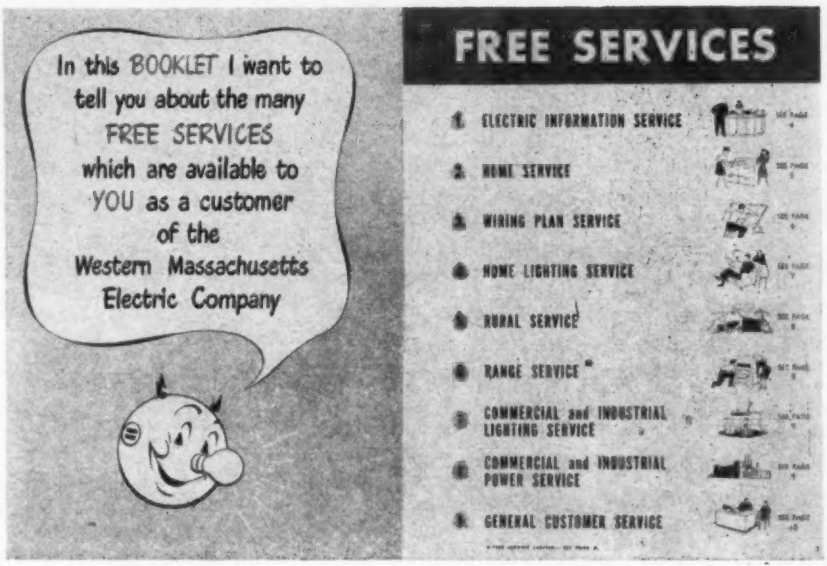
LOAD BUILDING

Promoting Service by Information Centers

WESTERN Massachusetts Electric Co., a non-merchandising utility serving the central Connecticut Valley and Pittsfield areas, promotes the use of electricity by cooperation with other branches of the industry and by free advisory services to the public embracing all phases of operation. Recently, unique "Information Centers" have been established at the principal offices in Springfield, Pittsfield and Greenfield, at which facilities have been provided to inform the public about the latest developments in appliances, wiring requirements, arrangements for electric range demonstrations, handling problems in kitchen planning, good lighting practice, industrial power service, meter reading, and rate trends. Through these centers customers and prospects can be brought into touch with specialists in the company's organization to insure better selection of equipment for specific uses and more efficient use of service in domestic, industrial and commercial fields.


In this BOOKLET I want to tell you about the many FREE SERVICES which are available to YOU as a customer of the Western Massachusetts Electric Company
FREE SERVICES
1. ELECTRIC INFORMATION SERVICE
2. HOME SERVICE
3. WIRING PLAN SERVICE
4. HOME LIGHTING SERVICE
5. RURAL SERVICE
6. RANGE SERVICE
7. COMMERCIAL and INDUSTRIAL LIGHTING SERVICE
8. COMMERCIAL and INDUSTRIAL POWER SERVICE
9. GENERAL CUSTOMER SERVICE

Pages from booklet prepared by utility to encourage the public to make use of free services looking toward larger and better electrical facilities in home, factory and mercantile establishments

One of these free services of the company is the planning of wiring for customers contemplating the building of new homes, to remodel present residences or add electrical convenience outlets. Such plans provide a guide to the proper location of switches and outlets and toward adequate wiring for truly modern electrical living. Home lighting advisors survey customers' premises, make suggestions, and give lectures and demonstrations before women's groups, parent-teacher associations, granges and school groups. Advice on rural electrification, on industrial power requirements and processes and information about the economics of electric service are freely rendered. A booklet. "You and Me," prepared by the company and the Channing L. Bate Advertising Agency, Greenfield, features "Reddy Kilowatt" service.

• • •

ELECTRIC COOKING CLASS trains dealers

Dealers Turn Cooks To Learn About Ranges

IN THE home economics department of the Union Electric Co. a series of one-day electric cooking classes like the one shown in the illustration has been making amateur chefs out of 250 St. Louis Frigidaire dealers while teaching them the fine points of range operation. In the first three days 52 dealers were inducted

More foot-candles on the job when you install

ALZAK* REFLECTORS

*Produced by patented process

Alzak* aluminum reflectors have reflectivity efficiencies as high as 83%. More of the light from the lamps gets off to a good start on its way to where you need light.

And the high-efficiency Alzak surface is durable, easy to keep at peak efficiency by simple cleaning. The reflecting surface cannot chip nor peel. Is unharmed by dents and blows. Never rusts. Resists corrosion and loss of efficiency in industrial and seashore atmospheres.

You can get Alzak aluminum reflectors in all styles. If the label says "Alzak", you are getting the best lighting surface available. For names of manufacturers of Alzak lighting fixtures, write to ALUMINUM COMPANY OF AMERICA, 1978 Gulf Bldg., Pittsburgh 19, Pa. Sales offices in leading cities.

MORE people want MORE aluminum for MORE uses than ever

ALCOA FIRST IN **ALUMINUM**

IN EVERY COMMERCIAL FORM

New Life for OLD POLES as well as NEW ONES

Because Chapman "Penta" Preservative can be applied by spraying, brushing or soaking, it is the ideal treatment for protecting or reclaiming old poles. This is the same material which, applied by conventional pressure treatment, showed superior resistance to decay and termites in a careful 10-year test by the Forest Service, U. S. Department of Agriculture.

"Penta" Preservative leaves poles, cross arms and other treated wood clean and non-bleeding. Workmen do not object to handling or climbing treated poles, for Chapman "Penta" Preservative leaves no sticky or bleeding surfaces.

Poles treated with "Penta" Preservative can be obtained in all parts of the United States. Write us for details about protective or reclaiming treatments for old poles or other timber.

CHAPMAN

CHAPMAN CHEMICAL COMPANY
333 N. Michigan Avenue • Chicago 1, Illinois

"Penta" Preservative contains *Pentachlorphenol*, a product of *The Dow Chemical Company*.

into the "Order of the Cap and Skillet," each man preparing a meal on the electric range. This was the first use of Union Electric's home economics facilities for dealer training since the war.

•

"Who's That Knocking At My Door?"

SO that customers will know its people who come knocking at their doors, the Georgia Power Co. recently ran this advertisement in local newspaper. If the customer is a housewife, a farmer, runs a business or a plant, it may be the company's home economist, rural service engineer, lighting engineer, or industrial engineer paying a visit to help the customers get the most out of their electric service

•

Water Pumping Offers Attractive Long-Hour Load

MUNICIPAL PUMPING by scattered small units offers desirable loads for central station service in outlying communities where automatic operation of plants can be had. Concentrations of pumping units are not necessary, and the pumping of ground water from wells equipped with vertical units has many advantages in the way of relative freedom from dangerous bacterial pollution, nearly uniform temperature, and comparative coolness in summer.

Variable speed induction motors are often employed to meet the required pumping conditions and in a typical case where the equipment consisted of a Fairbanks-Morse seven-stage turbine pump and 150-hp. motor of the same make, capacities were 1.8 mgd. (million gal. per day) at low or first speed; 2.2 mgd. for second speed; 2.5 mgd. for third; and 2.9 mgd. for fourth speed. In this and another nearby installation over-all efficiencies exceeded 75 percent on test. In some cases several of these pumps are supplied through a single master meter from a 4-kv. distribution line.

At Woburn, Mass., four motor-driven units pumped a total of 651,418,125 gal. of water per year with an energy consumption of 848,371 kw.-hr., or at a rate of 767 gal. per kw.-hr., the total cost of power including a small lighting load being $22,487. The average head was about 227 ft. The several pumping units ran respectively 271, 232, 247 and 305 days, and the following total hours: 3,676, 3,073, 2,555 and 3,240. All but one unit, a 150-hp. machine, were of 75-hp. rating.

•

Electric Poultry Scalder Dresses Birds for Sale

Photo—H. V. Rickner

Preparing turkeys for sale with electric scalder

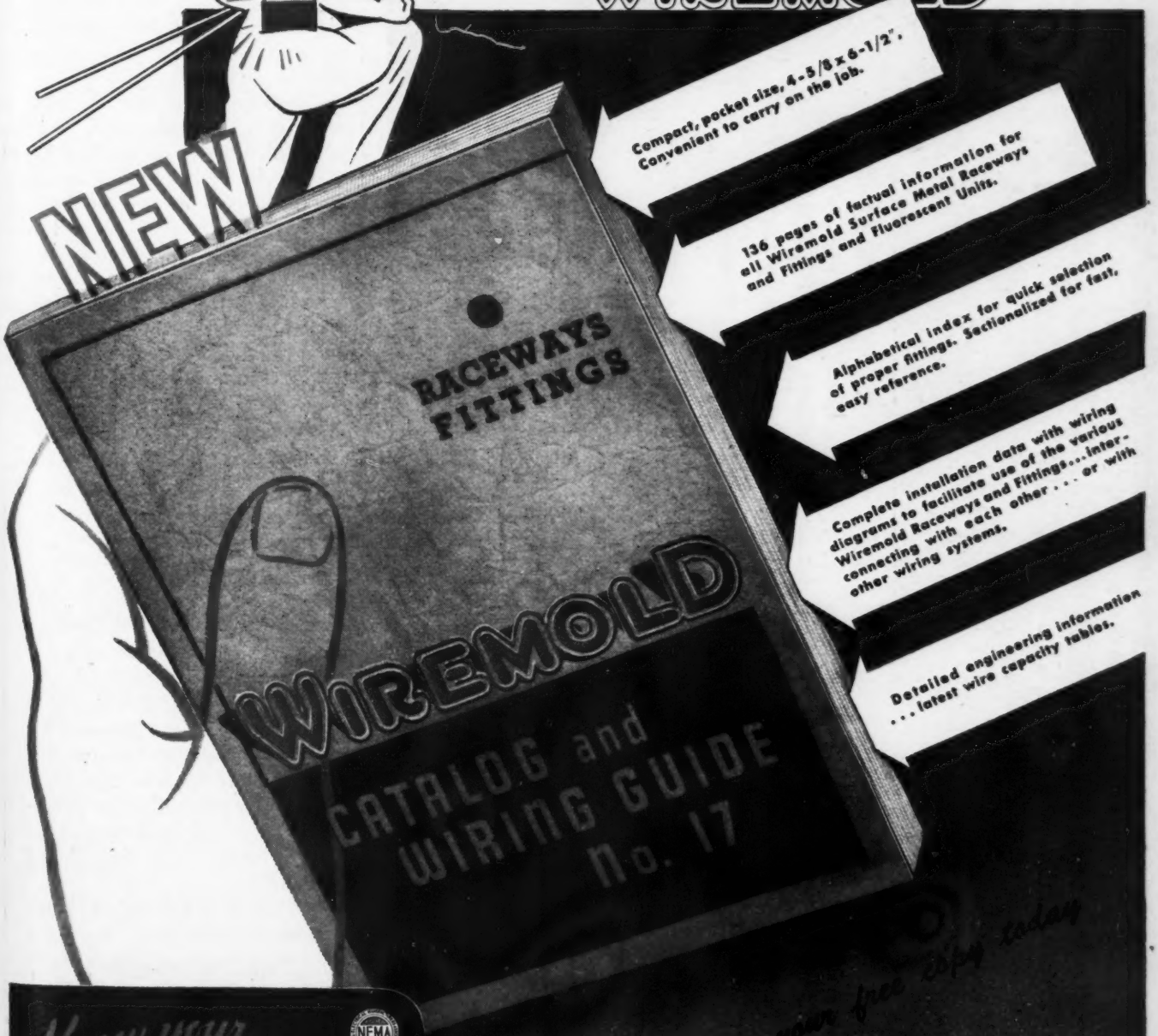
SO THAT dressed turkeys will have "eye appeal" to influence the buyer's decision, an electric scalder is being used as an aid in preparing the birds to be put on display for public sale.

The scalder was built by Olen T. Niles of Williamson, N. Y., who markets approximately 1,000 White Holland turkeys per year. A 5-kw. immersion type heater is located in the

"AS IMPORTANT AS ANY TOOL IN THE KIT"

say Electrical Contractors and Industrial Maintenance Men who recommend and install

WIREMOLD



Compact, pocket size, 4-5/8 x 6-1/2". Convenient to carry on the job.

136 pages of factual information for all Wiremold Surface Metal Raceways and Fittings and Fluorescent Units.

Alphabetical index for quick selection of proper fittings. Sectionalized for fast, easy reference.

Complete installation data with wiring diagrams to facilitate use of the various Wiremold Raceways and Fittings...interconnecting with each other . . . or with other wiring systems.

Detailed engineering information . . . latest wire capacity tables.

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..... MORE THAN ADEQUATE WIRING

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Rush my copy of Wiremold Catalog and Wiring Guide No. 17.

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City_____ **Zone**_____ **State**_____

bottom of an insulated tank in which water is heated to 130 deg. F. and held at that temperature by thermostatic control. After the usual dry picking of all tail and wing feathers, the turkeys are dipped into the hot water for about one minute for a semi-scald. This enables the pickers to remove the remainder of the small feathers quicker, more cleanly and with greater comfort to the fingers. The birds thus treated present a better appearance and bring a better price in the market.

The water container section is made of welded sheet iron, and has inside dimensions, 35 in. long by 18 in. wide by 16 in. deep. For insulation rock wool is used in the 4-in. space between the container and wood frame of the tank. Power for the heater is supplied from a 4,150/120-volt single-phase service on the rural lines of the Rochester Gas & Electric Co. The scalder consisting of the tank, heater and control cost about $90 to build.

•

Attention, Lighting Engineers!

"DETAILED performance data on a light-directional fenestration for school classrooms, and a simple formula and tables for calculating task brightness in any part of the classroom for any hour of the day and any sky condition—bright or overcast—for any of the four principal room orientations and for any location in the United States."

Thus does the author, Hugh Paul, describe the contents of a 72-page book, "Daylight in School Classrooms," made available to architects, school executives and educators by the Owens-Illinois Glass Co. Because of the engineering relationship between natural and artificial lighting in classrooms, the book is of value also to utility and other lighting engineers. Those interested may obtain a copy without charge by request to Mr. Art Lamb, Steve Hannagan Associates, 247 Park Ave., New York 17, N. Y.

LOOK TO LOCKE...FOR Convenient Stocks
OF DISTRIBUTION MATERIALS
A Complete Line
of distribution materials—pole line hardware and insulators — is maintained at each of many different points throughout the country in Locke's regional stocks and in distributors' warehouses. There's one convenient to you.
In these times of increased demands, temporary shortages of a few insulators may exist in certain locations, but continuously adjusted production schedules quickly remedy such conditions.
Depend on Locke for Quality Controlled distribution materials . . . pole line hardware and insulators. One order covers both.
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POLE LINE HARDWARE and INSULATORS
LOCKE INSULATOR CORPORATION • BALTIMORE 3, MARYLAND

CUSTOMER SATISFACTION IS "BUILT IN" FLUORESCENT LAMPS . . .

IF THEY HAVE *Certified Ballasts!*

To any portable lamp maker who is employing the new circular fluorescent tube in his product, the vital need for good auxiliary equipment is evident. Specifically, customer satisfaction depends on the BALLAST.

Make sure that the portable lamps you make or sell are equipped with CERTIFIED BALLASTS—for the protection of your customer and yourself!

Proper installation of CERTIFIED BALLASTS avoids excessive heat, which causes injury to table tops and floor coverings. CERTIFIED BALLASTS are free from noise . . . assure longer fluorescent lamp life and most light from the lamps.

The word "CERTIFIED" on the ballast you use means that it is built to rigid specifications to assure satisfactory operation of a fluorescent tube in a portable lamp. Nationally famous Electrical Testing Laboratories tests and checks the product against these specifications . . . give it the stamp of approval. And CERTIFIED BALLASTS have long been the accepted standard in commercial and industrial fluorescent lighting. They're your best assurance of customer acceptance and good will.

CERTIFIED E·T·L SPEC. NO. 6

CERTIFIED LAMP MAKERS have solved their ballast problems by writing CERTIFIED BALLASTS into their specifications.

CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting Fixtures

Acme Electric Corporation, Cuba, New York

Chicago Transformer Div., Essex Wire Corporation, 3501 Addison St., Chicago, Illinois

General Electric Co., Specialty Transformer Division, Fort Wayne, Ind.

Jefferson Electric Co., Bellwood, Illinois

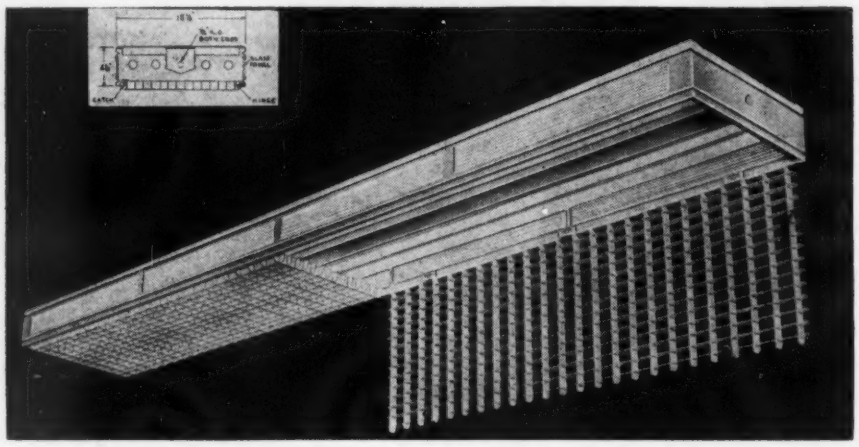
Sola Electric Co., 2525 Clybourn Avenue, Chicago 14, Illinois

Starring and Company, Bridgeport, Conn.

Wheeler Insulated Wire Co., 378 Washington Ave., Bridgeport, Conn.

NEW EQUIPMENT

New Slimline Fixtures Have Hinged Louver Frames



A NEW Linolite Slimline series has been added to the line of fluorescent fixtures manufactured by the Frink Corp., 27-01 Bridge Plaza North, Long Island City 1, N. Y. The new units are finished in white enamel baked at 350 deg. F. They are furnished with two-lamp ballasts which provide instant-start, 200-milliamp operation. Available for either two or four lamps, they can be mounted as individual units or connected to form continuous and uninterrupted runs.

Two hinged louver frames with specially designed latches for easy opening or removal provide low-brightness illumination with 45-deg. crosswise and 30-deg. lengthwise shielding. The framed glass side panels light adjoining ceiling areas to reduce contrast. Units are also available with all-metal side panels.

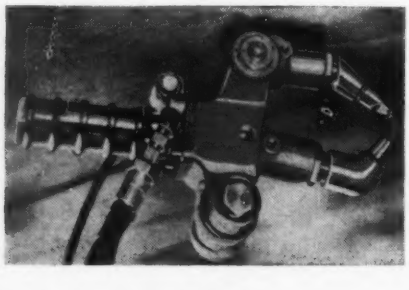
The two-lamp unit is 4½ in. deep, 11½ wide and 97 in. long. The four-lamp unit is 4½ in. deep, 15½ in. wide and 97 in. long. Matching spot and downlights are available for combination and accent lighting.

•

Hydraulically Operated Welding Gun Eliminates Sparks

A NEW DESIGN in a double-acting, hydraulically operated welding gun and booster has been introduced by the Dalhart Engineering & Mfg. Co., 14287 East Jefferson, Detroit 15, Mich. It is stated to make possible uniform welds, utilization of transformer heat, increased life of welding points, increased burning speed in welding, and elimination of sparks and burning.

The welding point pressure may be varied and controlled by the air pressure on the booster. The portable gun is attachable to a bench or pedestal to make a stationary unit with foot pedals. A long stroke cylinder may be attached to a deep throat yoke for welding long or irregular shaped articles.



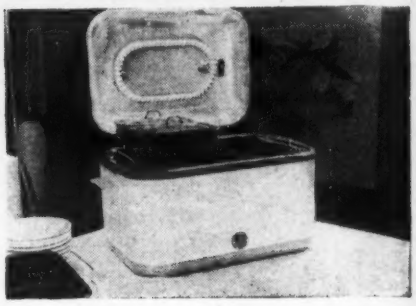
•

Roaster Broiler Unit Is Part of Cover

A PORTABLE electric oven with a broiler in the lid is being introduced by Proctor Electric Co., Philadelphia 46, Pa. The broiler operates on both alternating and direct current and can be removed or inserted for use as the needs arise.

Specifications of the new product are: broiler, 1,500 watts; oven, 1,320 watts; and glass wool insulation. The oven has a balanced heating element around all sides and in the bottom which may be used on 110-120 volt a.c. circuits only. The roaster lid is self basting and the broiler is self cleaning.

The thermostatically controller roaster pan will accommodate up to a 20-lb. turkey. It is finished in baked white enamel, has a gray acid-resisting inset pan and a chromium cover.

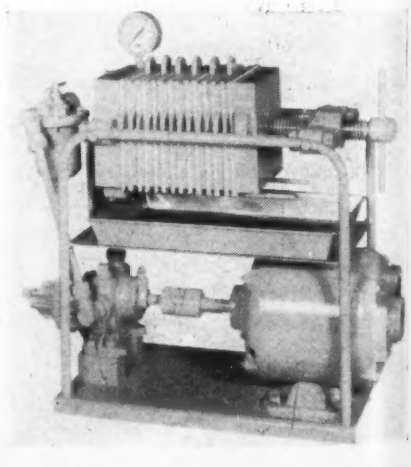


•

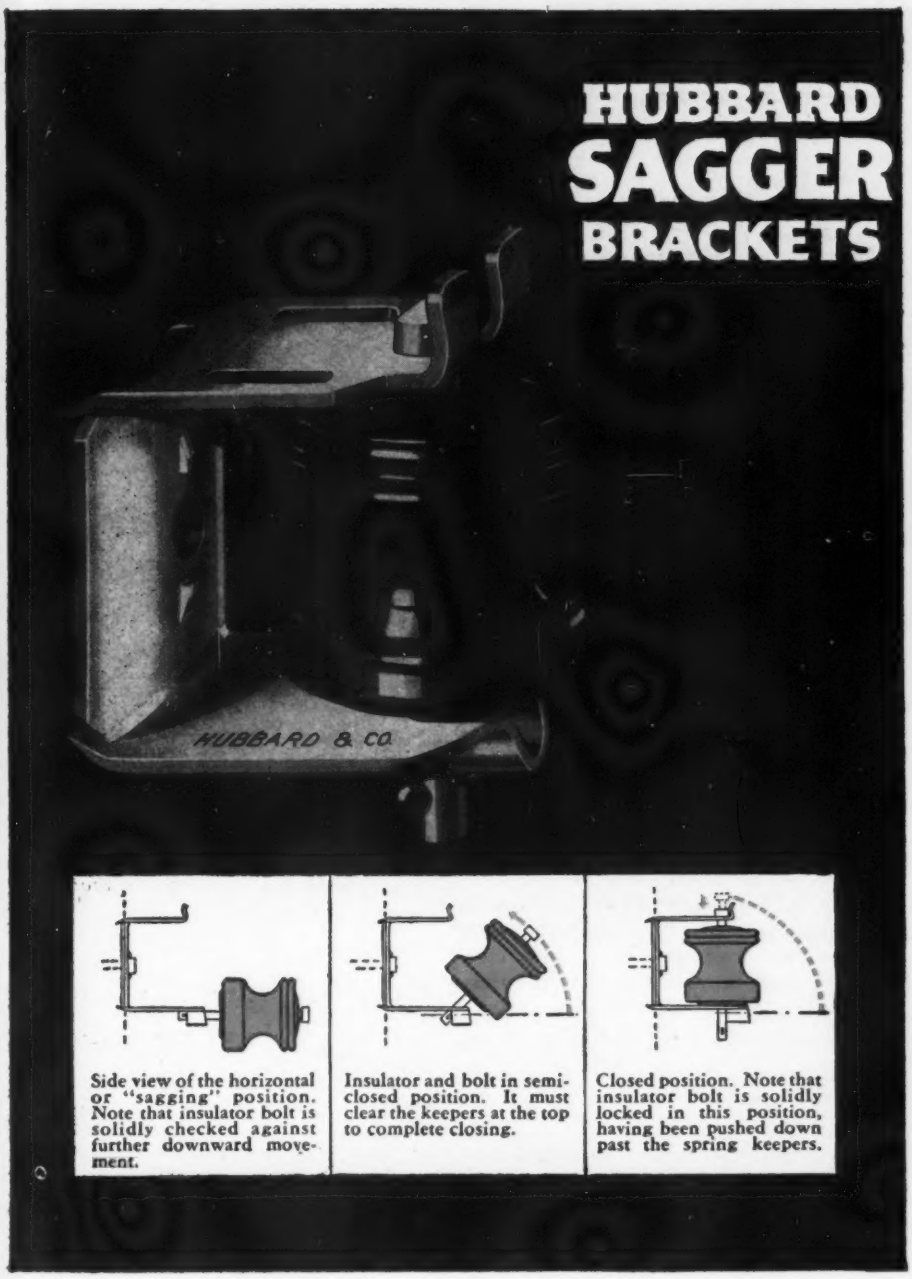
70-Pound Filter Press Has 60-Gallon Capacity

A PORTABLE filter press, weighing 70 lb. and having a capacity of 60 gal. per hour is being introduced by Buckeye Laboratories Corp., 6700 Morgan Ave., Cleveland 4, Ohio. The unit is 18 in. high, 14 in. long, and 8½ in. wide.

Incoming fluid is first passed through a Cuno filter which is stated to remove colloidal particles 0.0035 in. or larger. This feature is reported to protect the



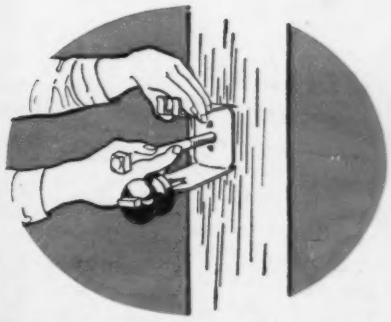
Something NEW IN SECONDARY DISTRIBUTION



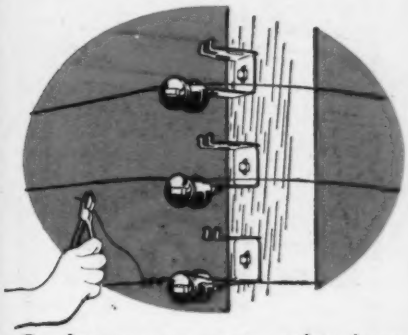
Side view of the horizontal or "sagging" position. Note that insulator bolt is solidly checked against further downward movement.

Insulator and bolt in semi-closed position. It must clear the keepers at the top to complete closing.

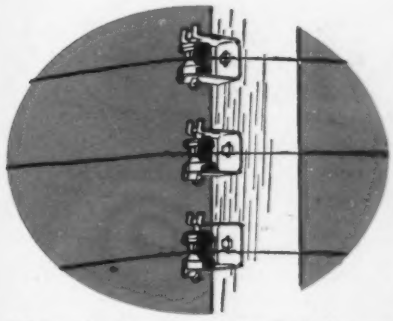
Closed position. Note that insulator bolt is solidly locked in this position, having been pushed down past the spring keepers.



Holes are drilled at correct spacing and machine bolt is inserted as shown.



Conductors are strung, using insulators as pulleys, until desired sag is obtained after which they are tied-in while still in the horizontal position.



After tying-in, the insulator bolts are raised to the vertical and dropped into the lock position.

For secondary distribution circuits, where a variety of problems are to be met, Hubbard No. 710 Sagger Bracket is the most flexible choice to meet the requirements. This Bracket may be described as a single, *separate,* secondary-rack point, which may be used with one or more similar points, at any desired spacing for any number of conductors.

No. 710 Brackets are versatile in other ways also. The patented feature is the arrangement of the insulator bolt which may be dropped to a horizontal position to allow the "sagging" of conductors with the insulator spool acting as a pulley. Insulator Bolts are locked in position when closed or open. Strength against line pull is provided by the broad back bearing against the pole, the backs being 3-inches in width. Spurs at the corners prevent the bracket from turning during and after installation. Bolt heads are trapped in the back to prevent turning while tightening.

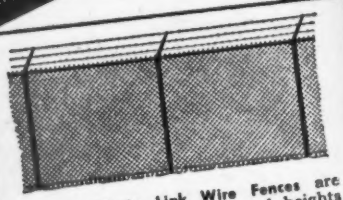
Hubbard Sagger Brackets have been tested and proved in service. Highly adaptable to any conditions, they have drawn praise from engineers, in every instance of the many installations made to date.

HUBBARD AND COMPANY

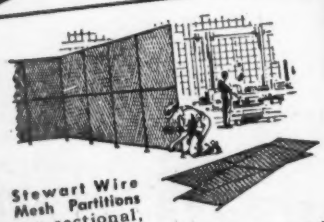
PITTSBURGH · CHICAGO **OAKLAND · CALIFORNIA**

STEWART FENCES
AND
METAL SPECIALTIES

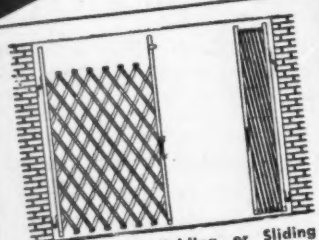
Stewart Wire and Iron Products include many items which are used extensively in the electrical field. Three are illustrated. Others are Iron Picket Fences and Gates; Wire and Iron Window Guards; Machinery Guards; Pipe Railings; All Steel Settees, etc.



Stewart Chain Link Wire Fences are made in several weights and heights to meet all requirements. Style 3TH is shown above. Also made in style 5TH (5 strands of barbed wire) and 0TH, without barbed wire overhang.



Stewart Wire Mesh Partitions are sectional, and made to fit any space. Give all measurements when writing for information.



Stewart Steel Folding or Sliding Gates are made in single and double construction to fit any opening.

Literature sent on request. When writing please mention products in which you are especially interested.

The Stewart Iron Works Co., Inc.
1466 Stewart Block Cincinnati 1, Ohio
Experts in Metal Fabrications Since 1886

Stewart IRON and WIRE FENCES

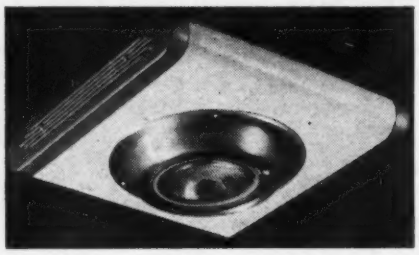
gear pump and to increase the efficiency of the filter press itself.

A built-in relief valve maintains fluid pressure below 60 psi. without interrupting the filtration process. The pump is driven by a 1/6-hp., 1,200-rpm. motor suitable for operation on a 110-volt, 60-cycle source.

•

Adjustable Spot Light Blends with Fluorescent

A NEW adjustable spot unit, designed to highlight merchandise, displays, etc., is being introduced by the Spero Electric Corp., 18222 Lanken Ave., Cleve-



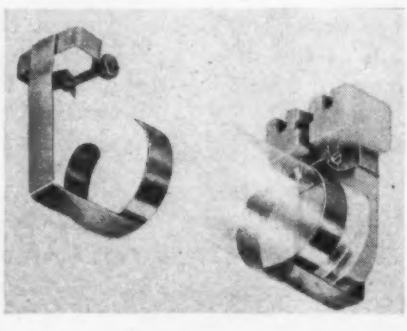
land 19, Ohio. Designated the "SU-LV-1," it is designed for use with the company's "LVR-448" fluorescent luminaire. It takes a PAR 38 lamp which can be adjusted to any fixed position up to 45-deg. angle from the perpendicular within a 360-deg. circle.

The unit's housing follows the contour of the "LVR" fluorescent luminaire, and can be mounted individually, between two of the fluorescent units in a continuous row, between two of the fluorescent units mounted at a 90-deg. angle, or at either or both ends of the "LVR" unit.

•

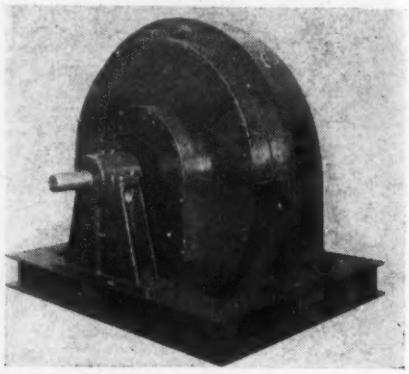
Fluorescent Lamp Guard Supports Tube Ends

A NEW fluorescent lamp guard, which supports the end of the tube and prevents it from falling out of the holders, has been reported by Den-El Equipment Co., 688 18th Ave., Irvington 11, N. J. It is made of stainless steel and is available in sizes which accommodate 40 and 100-watt tubes. The guard is installed with a machine screw and nut as illustrated.



Low-Speed Synchronous Motors Are Redesigned

GENERAL Electric Co., Schenectady 5, N. Y., has redesigned the company's line of low-speed synchronous motors to



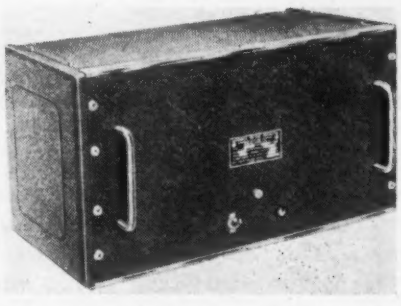
include splashproof construction. Design of the end-shield covers is said to make it easy to remove and assemble them when inspecting the motor.

The pedestal bearings are placed outside the housing to facilitate inspection of oil supply and oil ring operation. The new frame uses louvered openings for the side discharge of air rather than the flared-skirt type of opening. The conduit box is included in the frame structure to protect it from splashing liquids. An inspection window is provided in the air chute for viewing the brush holder and collector without removal of the covers.

•

Wave Distortion Eliminated By New Voltage Regulator

A NEW electronic voltage regulator, which is stated to provide instantaneous correction of line voltage with negli-



gible waveform distortion, is being introduced by Superior Electric Co., 524 Laurel St., Bristol, Conn. Known as the Stabiline, Type 1E 5101, it has a maximum load capacity of 1 kva.

Output voltage is stated to be held within plus or minus 0.1 volts of any value in the settable range between 110 to 120 volts for an input line change from 135 to 95 volts. Time for voltage recovery is usually between 3 to 6 cycles depending upon the line voltage, current and power factor, the manufac-

A MODEST PRODUCT *that started Six Factories*

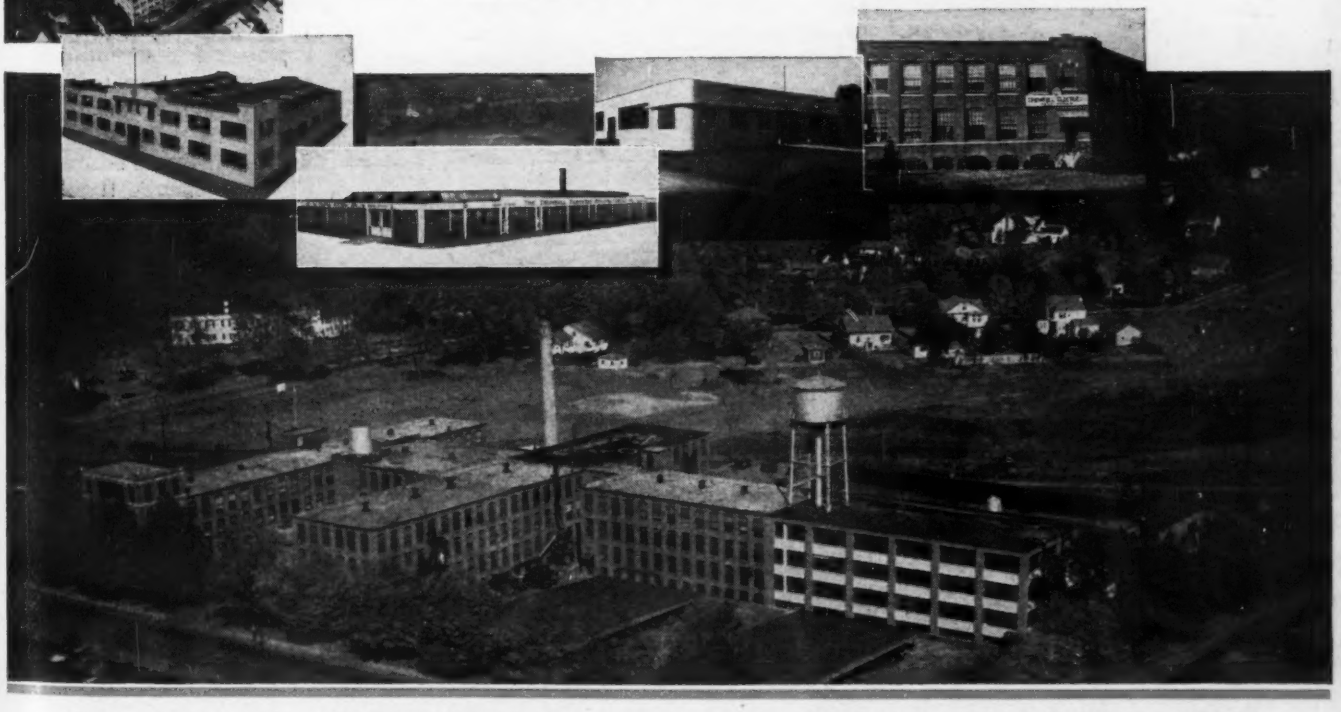
The picture of this Trumbull "Rosette" may draw a chuckle from modern electrical men . . . but like the discovery of the first nugget it showed the way to a streak of pay dirt that has never been exhausted in Trumbull's 48 years of continued progress.

From a modest single product in '99 to a complete line of electrical equipment in '47 . . . with national recognition all the way . . . is the result of an initial determination "to manufacture quality electrical products of first class material and slowly build up a reputation as a house of quality, selling at a fair profit."

A nation wide system of 333 leading electrical wholesalers, backed up by Trumbull sales and service men, brings the Trumbull line to your doorstep. From simple standardized switches to custom engineered switchboards and Busway Systems, Trumbull offers efficient control and distribution of Power and Lighting current for all residential and industrial requirements.

TRUMBULL (T) ELECTRIC

Pioneer in '99 *Pace Maker in '47*



THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, PLAINVILLE, CONN.

OTHER FACTORIES AT NORWOOD, OHIO • LOS ANGELES • SAN FRANCISCO • SEATTLE • WEST WORKS, PLAINVILLE, CONN.

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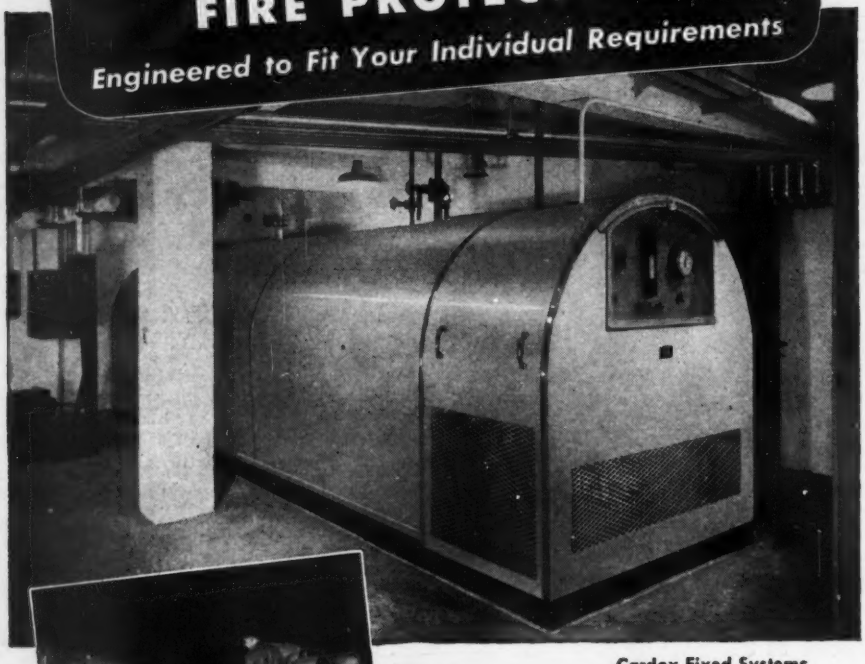
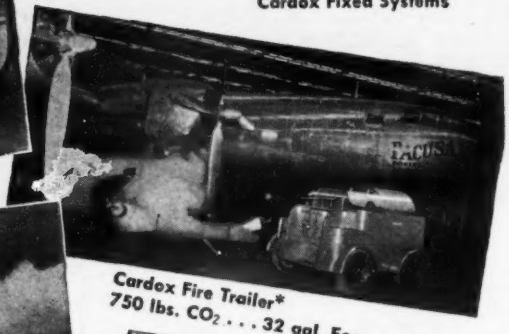
FIRE PROTECTION

Engineered to Fit Your Individual Requirements



Cardox Fixed Systems

Cardox Transitank*
750 lbs. CO_2



Cardox Fire Trailer*
750 lbs. CO_2 . . . 32 gal. Foam solution

Cardox Airport Fire Truck

Cardox Fire Truck

Cardox engineered applications of low-pressure carbon dioxide give this fast-acting, non-damaging medium new effectiveness in conquering fires, large or small, both indoors and out.

Whether the hazard or combination of hazards calls for *500 pounds* or *125 tons* of Cardox CO_2, a single Cardox System . . . with its compactly designed, centrally located Storage Unit—can be engineered to meet the *specialized* or *varied* fire problems involved. Cardox Mobile Units for indoor or outdoor protection put wheels under 750 pounds to 3 or more tons of carbon dioxide for instant use in any part of the property. Utilized individually or in planned combinations, Cardox Fixed Systems and Mobile Units have given new scope to all the recognized advantages of CO_2 fire protection. Write today for Bulletin 567 and recommendations for Cardox engineered protection for the tough fire hazards that worry you.

*Now available in many localities

CARDOX CORPORATION
BELL BUILDING • CHICAGO 1, ILLINOIS
District Offices: New York • Philadelphia • Pittsburgh
Cleveland • Detroit • Los Angeles • San Francisco
San Diego

CARDOX

CO_2 FIRE EXTINGUISHING SYSTEMS

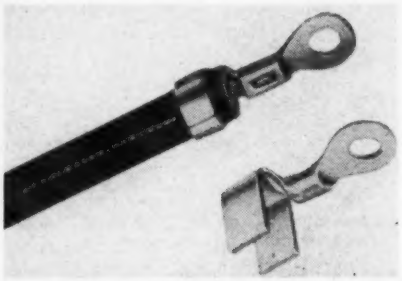
turer reports. It is stated to be independent of any load power factor change from a lagging 0.5 to a leading 0.9.

The manufacturer also reports that at no time does the percent of wave distortion exceed 3 percent and for the majority of conditions is between 1 and 2 percent. It is also stated to operate satisfactorily on frequency variations up to 10 percent of the designed operating frequency.

•

One-Piece Terminals Used On Heavily Insulated Wires

NEW ONE-PIECE, small-wire terminals for extra-thick insulated conductors have been announced by Burndy Engineering Co., Inc., 107 Bruckner Blvd., New York 54, N. Y.



They feature a U-shaped tab designed to accommodate the extra-thick insulation of conductors frequently used in the leads for switchboard wiring, radio transmitters, video, and other types of electrical and electronic equipment. The tabs grip a wide range of insulation sizes and are said to prevent fraying of the insulation as well as breakage of conductor stands under vibration. The connectors are indented onto conductors by means of the company's Hytool or Hypress.

•

Induction Motors Redesigned In Frame Sizes Up to 505

A REDESIGNED LINE of series D induction motors in NEMA frame sizes from 203 to 505 has been announced by Burke Electric Co., 273 West 12th St., Erie, Pa. They are of drip-proof design and will accommodate either double-sealed ball bearings or sleeve bearings.

Ventilating openings are below the centerline with end baffles directing incoming air over the windings and out at side openings between the feet. This double-end method of ventilation is said to permit lower air velocities and, therefore, quieter operation.

Rotor windings for frame sizes to 365 are of one-piece cast aluminum and these are embedded in closed slots. The face of the rotor is machined to provide the correct air gap. For frame

Runner for 115,000-hp. capacity Francis type turbine built by Baldwin for Hoover Dam.

PROPELLER TYPE TURBINES for economical development of uniform heads, 100 feet or less.

KAPLAN TYPE TURBINES, for heads of 100 ft. or less, provide peak output with maximum efficiency under heads that vary with conditions.

PELTON (impulse) TYPE TURBINES for high heads, abrasive water conditions, or small horsepower installations.

FRANCIS TYPE TURBINES assure top output under heads up to 1,000 feet.

BALDWIN
hydraulic turbines
for every type of power development

BLW THE BALDWIN GROUP **BALDWIN**

The Baldwin Locomotive Works, Philadelphia 42, Pa., U. S. A. Offices: Philadelphia, New York, Boston, Birmingham, Houston, St. Louis, Chicago, Cleveland, Detroit, San Francisco, Seattle, Washington, Pittsburgh

HOW TO MAKE POLES LAST LONGER

Just off the press. A factual booklet describing 12 years field experience with OSMOPLASTIC in ground line treatment of standing poles as well as other timbers. Explains the Osmoplastic method of treatment in detail. Write for your copy.

OSMOSE WOOD PRESERVING CO. OF AMERICA, INC. 1437 BAILEY AVE., BUFFALO 12, NEW YORK

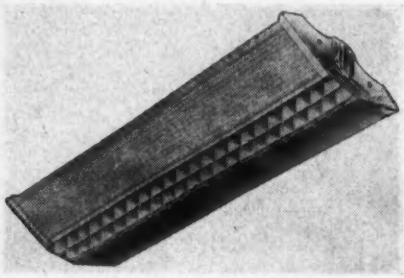
sizes from 404 to 505 the construction is similar except that the rotor windings are of the copper-bar type. The extensions of the hand drawn copper strips provide the fan action.

The series are built in type NAD (normal starting torque—low starting current), NED (high starting torque—low starting current), and NCD (high starting torque—high slip.)

•

Commercial Fluorescent Unit Is of Modified 'V' Design

A NEW fluorescent commercial unit which is of a modified "V" design with egg-crate louvers has been introduced by the Bright Light Reflector Co., Bridgeport, Conn. Known as the Vanguard, it is recommended for use in offices, stores, showrooms, hospitals and schools.

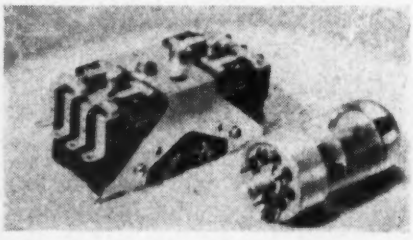


The side glass panels of frosted ribbed glass are top-hinged to facilitate maintenance, slotted in sections to eliminate dark ends. Canopy and stems are optional. Units may be mounted in continuous rows without moving ends or using special parts or fittings.

•

Latching Relay Stability Increases with Use

A NEW multicircuit switching relay of the latching type has been announced by Sigma Instruments, 70 Ceylon St., Boston, Mass. The manufacturer reports that freedom from the effect of vibration and shock is attained by dynamically balancing the moving system. It is also stated that mechanical wear increases rather than decreases latching stability.



Individual switch positions, of which there are eight, each of which may be normally open or normally closed, carry a nominal rating of 5 amp. at 110 volts a.c. or 24 volts d.c. Contacts may be ganged or arranged in pairs for a maximum of four double-break circuits.

Coils, which operate from direct current, are said to require pulses of less than 0.5 watt for tripping and are available with resistances from very low values up to 10,000 ohms. Common applications range from momentary contact controls to various protective circuits including electronic tube overload or underload.

•

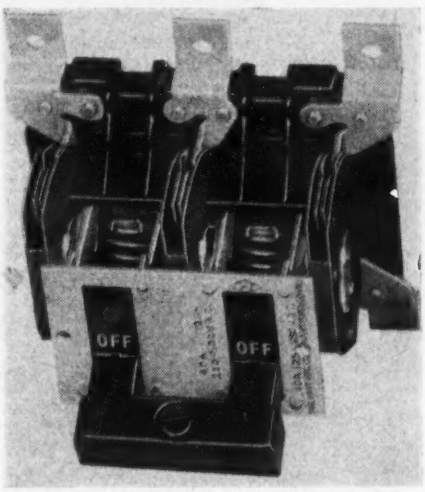
New Low-Temp. Welding Rod Usable on Zinc-Base Castings

A LOW-TEMPERATURE welding rod for use on zinc-base die castings has been introduced by All-State Welding Alloys Co., Inc., 96 West Post Road, White Plains, N. Y. It is available in $\frac{1}{32}$-in. diameter and has a working temperature of 400 deg. F. It can be used with or without flux, has a shear strength of 25,000 psi., and is stated to give a perfect color match.

•

Marine Tumbler Switches Suitable For Other Uses

A NEW LINE of heavy-duty, one, two, and three-pole tumbler switches has been developed by the Hart Mfg. Co., 108 Bartholomew Ave., Hartford, Conn. They are known as the "Diamond H" Type TU switches and are designed for

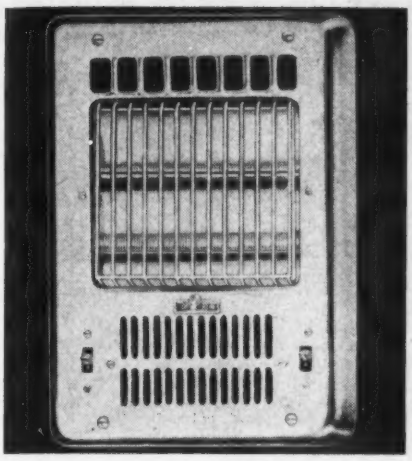


either a.c. or d.c. circuits. The switches are rated as 60 amp. up to 250 v., d.c. and up to 500 v., a.c. Developed to withstand marine usage, they are also suitable for domestic and industrial applications.

•

Recessed Wall Unit Produces Infrared and Direct Heat

A BUILT-IN recessed wall heater which contains an infrared as well as a resistance heating element has been introduced by LaSalle Lighting Products,



Inc., and Markel Electric Products, 145 Seneca St., Buffalo 3, N. Y. Known as series 230, its construction and principle of operation are the same as the company's Fan-Geo Heetaire portable unit.

The unit is made with 1,250, 1,500 and 2,000-watt heating elements for use on both 115 and 230-volt circuits. The wall box is 10½ in. wide, 15 in. high, and 3 in. deep. The wall plate is 12 in. wide by 18 in. high and is finished in polished Nuchrome.

TECHNICAL LITERATURE

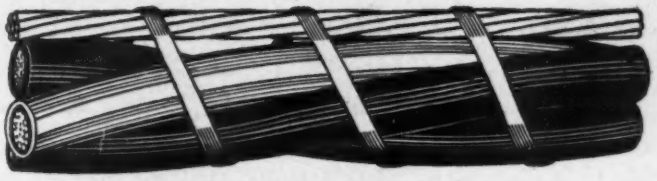
Mica—One of the "War Changes in Industry Series", Mica, report No. 21, is available from Superintendent of Documents, Government Printing Office, Washington, D. C., at 25 cents per copy. It treats uses, production, tariffs, etc., of the material.

Welding—"Learning to Weld," a booklet providing a basic approach to the art of welding, is available from Lincoln Electric Co., Cleveland 1, Ohio, for 25 cents per copy. Subjects treated are protective clothing and equipment, striking the arc, various welding positions, types of welds, fit-up of parts, and procedures for making various types of welds.

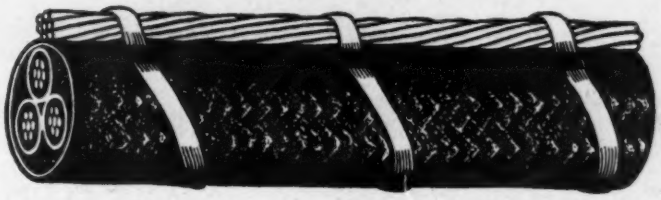
Standard Symbols—"Basic Graphical Symbols for Electric Apparatus," known as American Standard Z32.12-1947, sponsored by the American Institute of Electrical Engineers and the American Society of Mechanical Engineers, is available, at 40 cents per copy, from American Standards Association, 70 East 45th St., New York 17, N.Y. This new standard may be described as a "master" standard because it consists of 152 basic graphical symbols and their components to depict electrical devices on drawings in power, electrical control and communication. The basic symbols cover requirements in Z32.3, Z32.5 and Z32.10 Standards for those fields.

Lighting — Illumination Specific No. 5-1-47, entitled The Lighting of Control Boards, has been prepared by Holophane Co., Inc., 342 Madison Ave., New York 17, N. Y. Methods outlined in the bulletin are applicable to lighting of all vertical surfaces such as meter panels, wall charts and maps, blackboards, bulletin boards, etc.

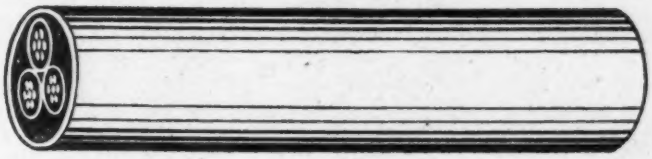
Simplex Aerial Cables



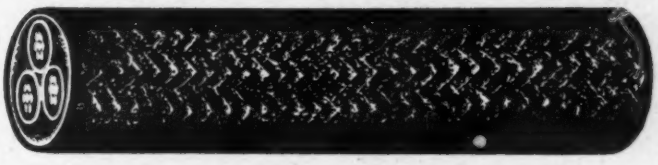
ANHYDROPRENE Type - Self-Supporting.



Braided Type - Self-Supporting.



Lead Covered Type.



Braided Type.

No matter what your needs may be in aerial cable — whether they are cables for power or control — Simplex makes a type and a style that will fit the conditions in your area.

Four general types are shown above. Two are self-supporting and two are for use in the conventional manner with messenger wire. Each individual style is particularly suited for use where special conditions require special constructions.

Simplex engineers will be glad to work with you and give you the benefit of their many years' experience in designing aerial cable systems. If you have an aerial cable problem, or are considering extending an aerial cable line, why not get in touch today with the Simplex engineer? He will be more than glad to help you.

Simplex - WIRES & CABLES

SIMPLEX WIRE & CABLE CO. 79 SIDNEY ST. CAMBRIDGE 39, MASS.

COMPETITIVE BID SALE

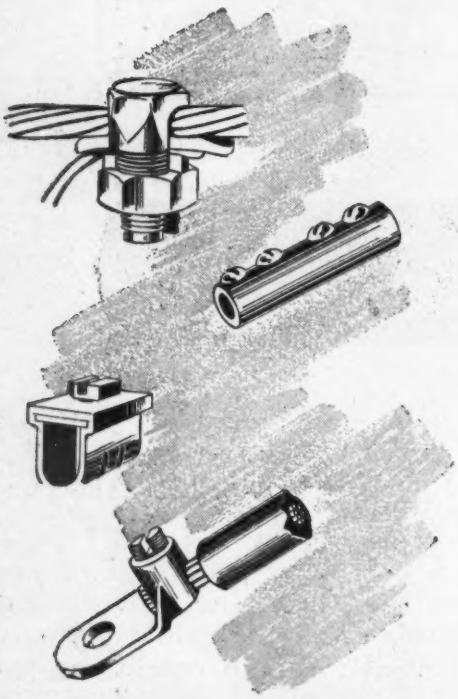
SOLDERLESS CONNECTORS

SOLDERING LUGS

WAA offers you another big chance to save on your electrical material needs.

Here it is—almost $2,000,000 worth of solderless connectors and soldering lugs will be sold on sealed bids. The following Regional Offices: BOSTON, NEW YORK, PHILADELPHIA, CINCINNATI, CHICAGO, LOS ANGELES, SAN ANTONIO and SAN FRANCISCO have the largest inventories.

For full information concerning descriptions of items, location, packaging, and conditions of sale write to any of the above offices or visit your Customer Service Center. At the same time request that your name be placed on the Regional Office mailing list for this type equipment.



SOLDERLESS CONNECTORS

Many Types Available in Large Quantities.

SOLDERING LUGS

Most Sizes Are Available.

Exporters! Your business is solicited. Much material which is surplus in the United States is urgently needed or is readily salable in other countries. Watch for other offerings; many of them may be of interest to your clients.

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Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati Cleveland • Denver • Detroit • Grand Prairie, Tex. • Helena • Houston • Jacksonville • Kansas City, Mo. Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Omaha • Philadelphia Portland, Ore. • Richmond • Salt Lake City • St. Louis • San Antonio • San Francisco • Seattle • Spokane • Tulsa

1212

NEWS ABOUT PEOPLE

Blake D. Hull Elected President of A.I.E.E.

Blake D. Hull, chief engineer of the Southwestern Bell Telephone Co., St. Louis, Mo., since 1936, has been elected

B. D. HULL

president of the American Institute of Electrical Engineers for the 1947-1948 term. In his capacity as chief engineer, Mr. Hull has been directly responsible for the engineering design of additions to the telephone plant throughout the five Southwestern states. During the war, Mr. Hull spent about a year and a half with the construction section of OPM (later WPB). Subsequently he served for a year as consultant for the Defense Plant Corporation.

For more than 30 years, Mr. Hull has been active in the work of the American Institute of Electrical Engineers. At the present time he is a member of the committee on transfers and of the subcommittee on professional development. Other committees on which he has served include communication, nominating, technical program, and Institute policy.

Under the automatic retirement rules of the Bell System, Mr. Hull will retire from active service on October 1, which will leave him free to give full attention to the duties of the A.I.E.E. presidency to which he has just been elected.

•

▶ D. B. CROW, manager of the Rutherford Electrical Membership Corporation, has been elected president of the North Carolina Mutual Electric Association of Managers at the recent annual meeting in Winston-Salem.

•

Made Power Pool Manager for United Light System

United Light & Railways Service Co. has announced the appointment of C. B. Kelley, electrical engineer in charge of power stations at the Kansas City (Mo.) Power & Light Co., as power pool manager with offices in Des Moines. In his new assignment, Mr.

C. B. KELLEY

Kelley will control all the operations of the 161,000-volt interconnecting transmission line now being constructed by six companies in the United System.

The new line will enable all companies to utilize more effectively their equipment and to pool their resources for emergency uses. It will extend on the north from the tri-city group of Davenport, Moline and Rock Island, westward to Iowa City and Des Moines, southwest across Iowa and through Missouri by way of Maryville, St. Joseph, to Kansas City, and thence to Fort Scott, Kan., as the southern terminus.

Mr. Kelley has been associated with the production department of Kansas City Power & Light Co. since 1920. He is a member of the American Institute of Electrical Engineers, the Missouri Society of Professional Engineers and the Electrical Maintenance Engineers of Greater Kansas City.

P.G. & E. Announces New Executive Appointments

William G. B. Euler, vice-president in charge of operations of Pacific Gas & Electric Co., has been appointed vice-

W. G. B. EULER

president and general manager, effective July 1, in one of several personnel changes announced by President James B. Black.

A. Emory Wishon, who will be suc-

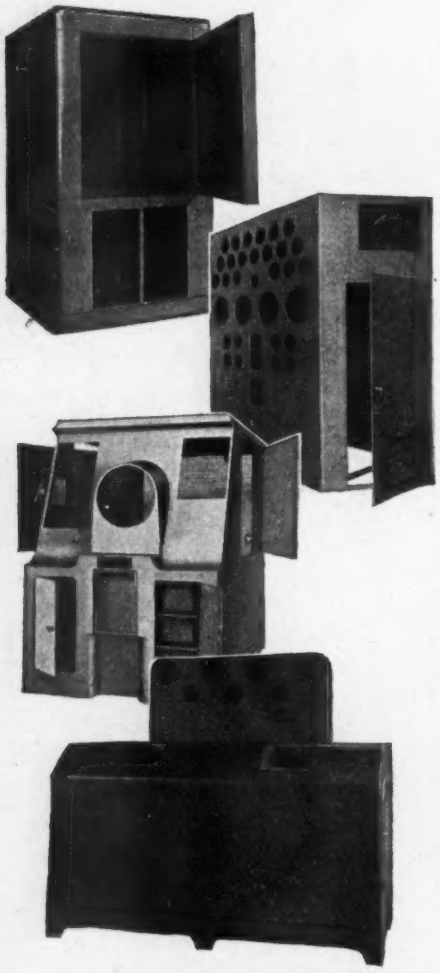
N. R. SUTHERLAND

ceeded by Mr. Euler, has been made executive vice-president, assisting the president in general supervision and directing the department of general construction in a $300,000,000 expansion program.

Mr. Black also announced the re-

OUR FIRST GOAL IN FABRICATING INSTRUMENT MOUNTING STRUCTURES

Artisans and engineers at Littleford understand and meet exacting requirements of manufacturers of electrical and hydraulic control equipment. Hence Littleford has become a foremost builder of such cabinets, panels, control boards, steel cubicles, mechanism boxes. Get structures right—get Littleford!



LITTLEFORD

LITTLEFORD BROS., INC.
421 E. Pearl St., Cincinnati 2, Ohio

tirement of R. E. Fisher, vice-president of public relations and sales, and the promotion of four P. G. & E. executives to vice presidencies.

Norman R. Sutherland, manager of the company's San Francisco division since 1945, succeeds Mr. Fisher. Also named vice-presidents were Dunlap D. Smalley, James S. Moulton and I. C. Steele.

Mr. Euler, a native of San Francisco and a graduate of the University of California, began his utility service with the engineering staff of Great Western Power Co. in 1910. He was general superintendent of Great Western's operations at the time of its merger with P. G. & E. and soon was transferred to headquarters in San Francisco. He became chief engineer in 1940 and vice-president in charge of operations in 1944.

Mr. Fisher leaves the company after 36 years of service, 25 as vice-president. Prominent in California civic affairs, he currently is serving as chairman of the Bay Area Council and as northern California chairman of the national Committee on Economic Development.

Mr. Sutherland, a native of San Francisco, has been with the company since 1913, when he joined the San Francisco division office as a clerk.

Mr. Smalley, who succeeds Mr. Euler as vice-president in charge of operation, has been with the company since his graduation from the University of California in 1910. He was general superintendent of the San Joaquin and Midland Counties properties of the company before his appointment last year as engineer of electric operation.

Mr. Moulton, executive engineer, was made vice-president and executive engineer. He has been with the company since 1921, having joined the San Joaquin Light & Power Corp. engineering staff following his graduation from Yale University. He later became executive engineer of the Great Western Power Co., then assistant to the vice-president and general manager.

Mr. Steele, chief engineer, was appointed vice-president and chief engineer. He began his employ with P. G. & E. in 1909.

•

▶ ERNEST B. KIPP has been appointed superintendent of San Diego Gas & Electric Co.'s electric meter division. Following his graduation from the University of Utah in 1926, Mr. Kipp spent three years in the Westinghouse plants as a graduate student. Following special assignment work for the Central Arizona Light & Power Co., Westinghouse appointed him meter relay and instrument specialist for the Western territory. In his new position he succeeds William H. Talbott, retired.

A. B. Chance Co. Assigns New Engineering Duties

Hugh A. Triplett, formerly chief engineer of Schweitzer & Conrad, Inc., Chicago, now the S & C Electric Co., has joined the engineering staff of the

H. A. TRIPLETT

A. B. Chance Co., Centralia, Mo., where he will be in charge of engineering the company's line of power switching equipment. Mr. Triplett received his early engineering experience with the H. L. Doherty Co. of New York

B. O. WATKINS

and the Duquesne Light Co., Pittsburgh. He joined Schweitzer & Conrad in 1925 as electrical engineer and was appointed chief engineer in 1937. He holds more than 40 patents in the field of power fuses and power switching equipment.

Bruce O. Watkins, formerly with the U. S. Bureau of Reclamation, Washington, D. C., has been appointed construction and maintenance equipment engineer for the company. A graduate of the University of Arizona, Mr. Watkins became an engineering member of the technical standards division of the Rural Electrification Administration, Washington, D. C., in 1937. While

with REA he served on various standards committees of that body and of the American Institute of Electrical Engineers. He also obtained operating experience with REA projects in Michigan and Arizona.

•

I. F. Baker Assumes New Executive Duties

Election of Ivan F. Baker as vice-president of the Westinghouse Electric International Co. has been announced recently. Mr. Baker has been treasurer

I. F. Baker

of the company since 1945, a position he retains along with that of director of the company.

Mr. Baker has been with Westinghouse since 1909, for the past 34 years with the International company. From 1919 until 1927, he was stationed in the Far East, first as manager for Japan and later as managing director of the company's Japanese branch. He was appointed manager for the Far East in the New York office in 1927, and held that position until 1930, when he was sent to London as European manager. He held the European position until 1937, when he again returned to New York. Since 1937, Mr. Baker has filled various positions in the sales department in the New York headquarters of the company.

•

Dr. H. C. Rentschler Retires

Dr. Harvey C. Rentschler, director of Westinghouse lamp and electronic tube research for 30 years, retired on June 1. Ten years ago, Dr. Rentschler, who has had more than 100 inventions patented, developed the Sterilamp, and ultraviolet lamp which produces bacteria-killing radiations. Since the beginning of this year as he approached retirement he has devoted himself to completing certain research projects in addition to serving

Collyer

Self-Supporting AERIAL CABLE

Messenger and Cable Preassembled at Factory

CUTS COSTS THREE WAYS

1 INSTALLATION:
Fast splicing and tapping.
No cross arms or grade clamps.
Shorter, less expensive poles.

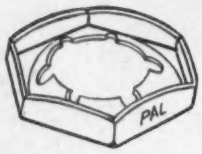
2 OPERATION:
Service uninterrupted by storms or sleet.
Low Dielectric Constant and Power Factor.
Can be tapped hot.

3 MAINTENANCE:
Tree trimming practically eliminated.
No lead to crack or fibrous coverings to festoon.
No ring cutting.

IT'S THE EXTRA QUALITY of Collyer Self-Supporting Aerial Cable that reduces cost *per year of service*. The protective jacket of tough, long-lived neoprene has high resistance to corona cutting, moisture, sunlight, tree abrasion and impact. Conductors are fully insulated with ozone-resistant oil base insulations having excellent ageing properties and high dielectric strength. This construction makes safe operation possible even when poles are down. Collyer Aerial Cables relieve wire congestion and improve appearance . . . the preassembled unit construction with rugged messengers of Copperweld make installation a single, rapid operation.

Write for information.

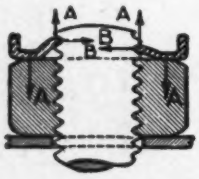
Collyer INSULATED WIRE COMPANY
245 ROOSEVELT AVE., PAWTUCKET, R. I.

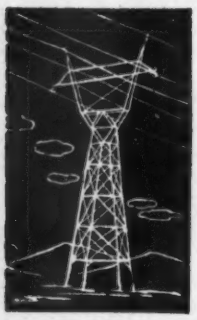


Palnut Self-Locking Nuts are inexpensive, single thread, tempered spring steel locknuts — easily, speeedily spun on top of regular nuts with the fingers, locked tight with a wrench.

***DOUBLE LOCKING ACTION**

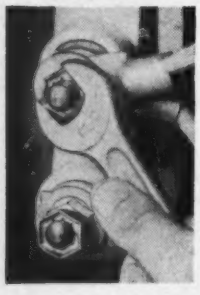
Arched, slotted jaws grip the bolt like a chuck (B-B), while spring tension is exerted upward on the bolt threads and downward on the regular nut (A-A), securely locking both.





PALNUTS for Wood Pole Lines and Steel Towers

Specify "Palnuts" on new lines—add "Palnuts" to existing lines, without disturbing regular nut. Eliminate further re-tightening and check-ups. Hot Dip Galvanized finish, in all utility sizes.



PALNUTS for terminal connections

Used on transformers, switches, disconnects, etc. Keep terminals tight, eliminate spring washers, assure full conductivity. Plain, Parkerized or Duronze according to needs.

• Send details of needs for samples and information on "Palnut" Self-Locking Nuts.

The PALNUT Co.
51 CORDIER ST. IRVINGTON 11, N. J.

in an advisory and consulting capacity. Dr. Charles M. Slack assumed the duties of director of research for Westinghouse Lamp Division last January.

•

Boulware Assigned to Direct G.E. Employee Relations

Responsibility for General Electric Co. policy pertaining to employee relations has been assigned to L. R. Boulware, a vice-president of the company. E. D. Spicer, vice-president formerly charged with this responsibility in the organization, will henceforth be in charge of the company's manufacturing policy, continuing as a member of the president's staff.

Mr. Boulware, who was elected a vice-president in 1945, has previously been in charge of the operations of the nine manufacturing affiliates of General Electric. His headquarters will be in New York. During the war he was operations vice-chairman of the War Production Board. Responsibility for the activities of affiliated manufacturing companies, relinquished by Mr. Boulware, has temporarily been assigned to Ralph J. Cordiner, vice-president and assistant to the president.

Mr. Spicer, making his headquarters in Schenectady, will not only be in charge of manufacturing policy, but will also be responsible for the coordination of matters relating to the training and transfer of all manufacturing personnel between company units. He has been a member of the G. E. organization since 1924, and a vice-president since 1941.

•

▶ B. B. Beckett, since 1923 rate engineer with the Pacific Gas & Electric Co., San Francisco, Calif., has retired.

▶ Rudolf Dueland, electrical engineer, Ebasco International Corp., New York, N. Y., has been awarded the King Haakon VII Liberty Cross. He was cited "for outstanding services rendered Norway during the war." Mr. Dueland was chairman of the electrotechnical sub-committee of the Advisory Committee on Industry to the Royal Norwegian Ministry of Supply and Construction.

▶ L. E. Smith has been appointed manager of the newly created personnel department of the Iowa-Illinois Gas & Electric Co., Rock Island, Ill. This department has been established for the purpose of developing activities relating to personnel procurement, selection, training, compensation, safety and welfare.

Holden Made Vice-President of Sylvania Electric

Grenville R. Holden, formerly assistant to the president, has been elected a vice-president of Sylvania Electric Products Inc.

The appointment of Gordon S. Hughes as merchandising manager of the fixture division of Sylvania has also been announced. In his new capacity,

G. R. Holden

Mr. Hughes will handle merchandising and sales of all lighting fixtures manufactured by the company. Since joining Sylvania in 1940 as a sales correspondent, he has served as supervisor of sales service and then merchandising supervisor. Mr. Hughes is active in the Illuminating Engineering Society.

Charles A. Burton has been appointed

C. A. Burton

assistant general sales manager of the lighting division and George W. Field and Ralph E. Niedringhaus will head the central and east central divisions of the company's sales forces.

Working directly under B. K. Wickstrum, general sales manager, in New York City, Mr. Burton's new duties include supervision over national ac-

counts, commercial engineering, U. S. government sales and the Sylvania Lighting Center. He has been with Sylvania Electric since 1938.

Mr. Field, who succeeds Mr. Burton as central division manager in Chicago, became affiliated with the company in 1941. Mr. Niedringhaus has been associated with Sylvania for the past nine years. Prior to his recent appointment as manager of the East Central division in Cleveland, he was connected with the company's Chicago, Kansas City and Atlanta offices as sales representative.

•

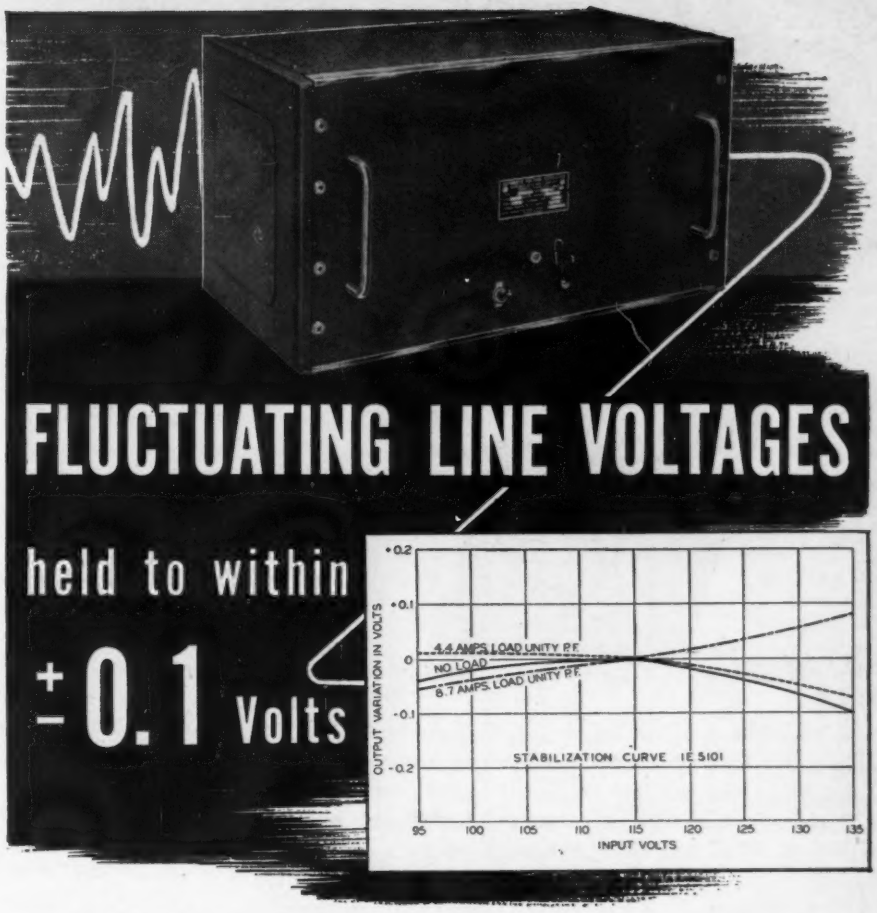
▶ E. P. LOVEJOY has been appointed director of the public information division of the Detroit Edison Co. as an extension of the company's customer and public information and educational services. Mr. Lovejoy joined the engineering staff of Edison in 1928, having served previously with General Electric Co. For the past three years he has been news director.

▶ LLOYD M. SMITH, Hollywood, Calif., has been appointed to a vacancy on the Los Angeles Board of Public Utilities and Transportation by Mayor Fletcher Bowron, succeeding the late Henry M. Burgeson. Mr. Smith has practiced law in Hollywood since 1933. Previously he had served on the public utilities board from July, 1940, to July, 1942.

▶ F. C. BOWEN has resigned as rate engineer of the Southwestern Gas & Electric Co., Shreveport, La., to reenter the armed forces. Mr. Bowen will be stationed with the Signal Corps in Washington, D. C. He has received the permanent rank of captain. He first was employed by Southwestern as rate engineer in 1940 and entered the Armed Forces in 1941. He returned to the company in 1945.

▶ DR. JOHN J. GREBE, director of the Dow Chemical Co.'s physical research laboratory, Midland, Mich., has received the John Wesley Hyatt award for outstanding achievement in the plastics industry last year. Dr. Grebe was given a gold medal and $1,000. ROBERT R. DREISBACH of the staff of the physical research laboratory, Dow Chemical, was given a silver medal by the Hyatt Award Committee for his achievement in the plastics industry in 1946.

▶ ANTHONY PINTO of the engineering department of the Otis Elevator Co., New York, has been appointed chief engineer of the company. Mr. Pinto joined the Otis company as test engineer in 1922 and two years later was made assistant chief engineer.



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With a STABILINE type IE Voltage Regulator in the power line, electrical apparatus is assured of constant voltage. Regardless of line changes — rapid fluctuations or slow variations — the delivered voltage is held to within ± 0.1 volts of the preset value. Typical are the performance curves of type IE5101. Although the input line voltage may vary from 95 to 135 volts, the preset output voltage is stabilized to well within ± 0.1 volts.

Fluctuating line voltage is just one problem of many in maintaining constant voltage. Others are varying frequencies, loads, power factors together with waveform distortion. An investigation of the STABILINE type IE will show, in addition to stabilization of ± 0.1 volts, such characteristics as . . . waveform distortion never exceeding 3 percent . . . regulation to within ± 0.15 volts for any load current change or load power factor change from lagging .5 to leading .9.

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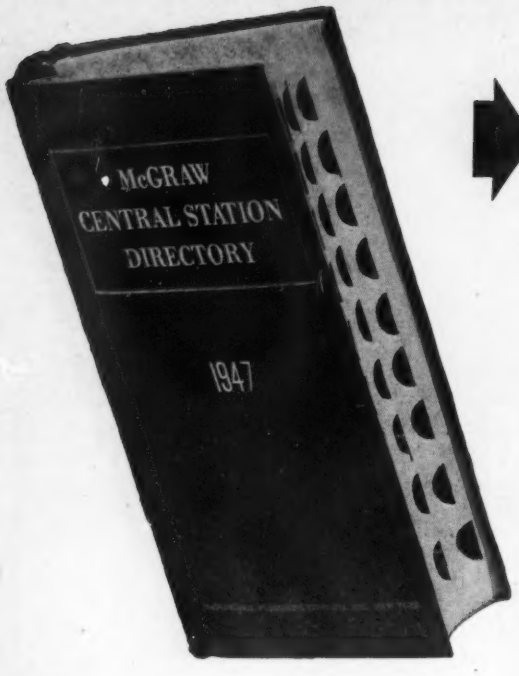


Presenting the 1947 edition of the

McGRAW CENTRAL STATION DIRECTORY

This latest, most accurate coverage of changes in electric utility operations and personnel is published for those who work in or sell to the electrical utility industry.

The 1947 edition of the McGraw Central Station Directory lists in one compact volume every discoverable change in the electric utility industry during the past 12 months. Changes in personnel and operations up to April 1, 1947 and other exclusive data on organization, areas served, generation and distribution equipment are included for each of 4,000-odd utility plants in the U. S., Canada and U. S. possessions.

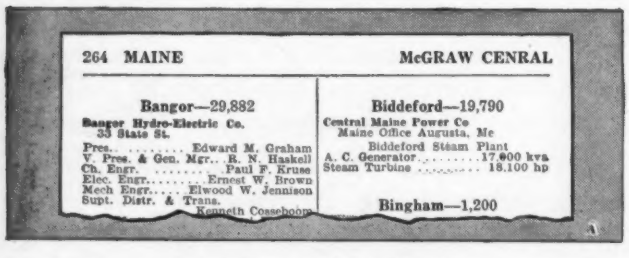
Facts Presented:

1. Names and addresses of private and municipally operated electric light and power companies in the U. S., Canada, and U. S. possessions; also government-controlled projects.

2. Names and addresses of affiliated, holding, controlling or managing and service companies with complete lists of properties controlled or managed by each, and including names and addresses of principal officials.

3. Names and addresses of officials and chief operating men for all operating companies, including:

- Presidents
- Vice Presidents
- General Managers
- Superintendents of Distribution
- Mechanical Engineers
- Commercial or New Business Managers
- Superintendents of Transmission
- Plant Superintendents
- General Superintendents
- Purchasing Agents
- Division or District Superintendents
- Chief Engineers
- Electrical Engineers
- Plant Engineers
- Merchandising Managers
- Division or District Managers



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V. Pres. & Gen. Mgr.. R. N. Haskell
Ch. Engr. ..... Paul F. Kruse
Elec. Engr..... Ernest W. Brown
Mech Engr.... Elwood W. Jennison
Supt. Distr. & Trans. ..... Kenneth Cossboom

Biddeford—19,790
Central Maine Power Co
Maine Office Augusta, Me
Biddeford Steam Plant
A. C. Generator ..... 17,000 kva
Steam Turbine ..... 18,100 hp

Bingham—1,200

Sample page of Directory.

REA Co-ops Listed:

REA co-operatives are again listed separately in the back of the Directory. This list includes new co-operatives energized during the past year.

Use by Utilities:

The directory is used by hundreds of utility executives who wish to know about:

1. The organization of other utilities, especially those in their own or adjoining areas.
2. Movements of officials from company to company.
3. Discernible trends in expansions of operations of other utilities.

Use by Manufacturers:

Manufacturers of electrical generating, transmission and distribution equipment, and manufacturers of general equipment and supplies, all serving the vast utility industry, make constant use of the directory for

1. Names and addresses of executive, supervising, managing and engineering officials.
2. Determining electrical characteristics of plant, equipment and lines now in use.
3. Knowledge of scope of operations: generating capacity, towns and number of meters served, etc.
4. For each operating company, the following information is presented:

- Company total and plant individual generating capacity in kva. or kw.
- Kind of prime mover and capacity in hp.
- Amount of power purchased in kw hrs.
- Type of current distributed, No. of wires, phase, voltage and cycle.
- No. of meters served.
- Location of power plants.
- Complete list of towns (of 500 population or over) served.
- A complete alphabetical index of companies listed.

Edition Limited:

Shortage of paper and binding facilities again necessitates limiting the 1947 edition. Orders will be filled in order of receipt. The Directory is sturdily bound in flexible blue Fabrikoid, fully thumb-indexed, size—4½″ x 8½″. Price $30.00 per copy. 10% discount on 5 or more copies. For intelligent, productive planning and selling, a copy of the 1947 edition of the McGraw Central Station Directory should be in the hands of every executive responsible for such plans.

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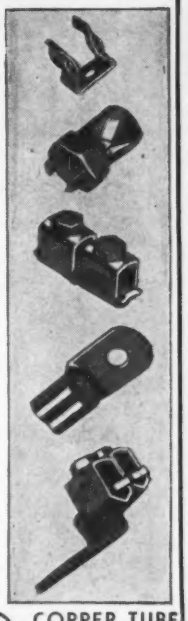

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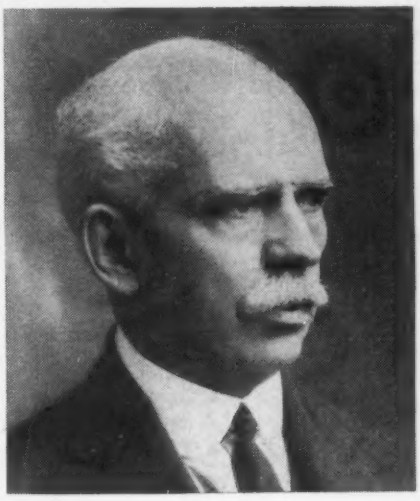
OBITUARY

J. Brodie Smith

J. Brodie Smith, 86, vice-president of the Public Service Co. of New Hampshire and an outstanding leader in



electrical development in the Granite State, died recently at Manchester, N. H.

He was born in Richville, N. Y., and entered the electrical field as a contractor in Manchester in 1885, later being superintendent of the city's fire alarm telegraph. He was the first superintendent of the Ben Franklin Electric Co. Upon its consolidation with the Manchester Electric Light Co., he continued in this office and was later general manager of this utility and the subsequently formed Manchester Traction, Light & Power Co., becoming vice-president in 1905, and holding that position with the Public Service Co., formed in 1926, until his death. Until his last illness Mr. Smith was at his office almost daily. He was long president of the city water commission and identified with civic, philanthropic and state interests for many years.

•

► JUSTUS B. ENTZ, an electrical engineer and inventor, who held 75 patents in the automotive field, died on June 8 in the New Rochell Hospital at the age of 79. A native of New York, and a graduate of City College, he started his career in 1887 with the Edison Machine Works in Schenectady, N. Y., of which he became chief electrician. Later Mr. Entz was a partner in the Waddell-Entz Co. of Bridgeport, Conn.; chief engineer of the Electric Storage Battery Co., Philadelphia; a vice-president for the Electric Vehicle Co. of Hartford, Conn., and an electrical engineer with the White Motor Co. in Cleveland and the Entz Motor Patent Corp. of New York.

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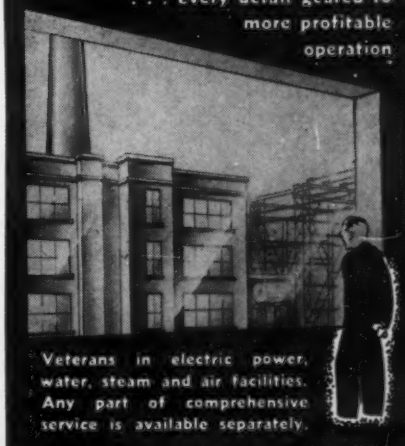

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MANUFACTURERS & MARKETS

Appliance Shape and Contour Patents Protect Against Unknown Brands

Actions of unknown brand appliance manufacturers in copying the design and contours of known brands is bringing about a fundamental change in patent coverage. Proctor Electric Co., the first known company to take direct action, is establishing a firm policy of patenting the artistic shape and contour of each product as well as its mechanical details.

The action, designed to protect the public as well as the manufacturer, has long been desirable, Joseph Myers, company vice-president, told ELECTRICAL WORLD. However, it has only been recent developments that made us consider it mandatory for customer protection, he added.

Interior Not Copied

"It is only when a manufacturer's product has acquired a certain standing in the public mind that it is subjected to unscrupulous infringement of its design," Myers continued. "Ambitious opportunists seeking to capitalize on an already established reputation in which the public has confidence have no hesitancy in imitating the looks of a product so, that upon first glance, it looks to be the original itself, even to those most familiar with it.

"Proctor recently found itself in such a situation when the design of its 'Champion' iron was copied by not one, but two newcomers to the field. One of the copies is so flagrant a 'steal' that the shell, handle, cord and backplate could be used interchangeably with ours. The second iron copied the styling of Proctor's handle and shell.

"Neither manufacturer attempted to copy the interior construction of the Proctor iron, evidently being aware that the company had fully protected, by patents, all the improvements developed in its laboratory. They contented themselves with merely creating a resemblance to an established product which would invite the customer to buy.

"To protect itself against such unscrupulous stealing and to safeguard the good reputation it has built up through the years, Proctor has recently announced that design patents, as well as mechanical patents, will be taken out on all future models of each product. These models will cover the artistic shape and contour of each development of the company.

"If imitation is the sincerest form of flattery, then Proctor is well complimented that, out of all available styles of irons on the market, theirs was the one to be copied. But the company couldn't see it that way—especially when, upon further examination, it was revealed that the mechanical construction of these irons represented a retrogression in iron manufacture, one copy actually perpetrating a fraud upon the unsuspecting public by selling with a lifetime service guarantee a product that couldn't withstand three months of normal use."

An examination of the three irons reveals the soleplates, except for degree of polish, identical. Handles were all of molded plastic. However, the concealed parts—heating element, insulation, and thermostatic bimetallic strip—were in no way similar. The copies appeared to be of questionable design and serviceability.

Myers concluded by stating that "the larger and more influential a company becomes the more jealously it must protect the public and guard its reputation. As the utility protects the customers' service so must we do everything to protect the customers' product."

•

U. S. Rubber Expands Wire Plant Facilities at Bristol

Expansion of wire production facilities in the Bristol, R. I., plant of United States Rubber Co. has been announced by C. W. Higbee, manager of the company's wire and cable department.

The expansion involves purchase of more than a $1,000,000 worth of rubber and plastic insulating equipment from the government and other sources. The additional facilities are expected to increase the plant's capacity to three times its pre-war output. The bulk of the new machinery is designed for insulating wire by the company's patented Laytex dipping process.

In announcing the expansion program, Mr. Higbee predicted a continu-

X-RAY EYES—Joseph Myers, vice-president, and C. Rogers Turner, assistant vice-president, become X-ray eyes for customers in examining the "heart" of irons of similar appearance. Studies resulted in a new patent policy

ing heavy demand for electrical wire. He expects many new applications, including industrial heating, plating, annealing and vulcanizing by electrical methods. He also foresees increased extension of electricity into rural homes.

He said the copper shortage which had been hampering production is now being solved by the use of aluminum conductors in wire.

•

Court Will Reargue Line Material Anti-Trust Case

In an apparent failure to reach a decision, the Supreme Court last week ordered reargument of the anti-trust case brought by the government against the Line Material Co., Southern States Equipment Corp., and ten other manufacturers of dropout fuse cutouts.

The case originally was argued before the high court last April. The reargument order assigns it to the fall term of the court which starts in October.

The case arose out of a cross-licensing agreement on fuse cutouts patented by Line Material and Southern States. The Justice Department charged that the agreement included a provision forbidding other manufacturers to sell the fuse cutouts at prices lower than those charged by the two companies holding the patents and that this was a violation of the Sherman Act.

The Federal District Court at Milwaukee dismissed the government's complaint on the grounds that a manufacturer who makes and sells a product under patent has the rights under patent law to fix the price of the product through licensing. The government appealed the case to the Supreme Court, contending that this and previous court decisions dealing with price fixing under patent licenses were in error.

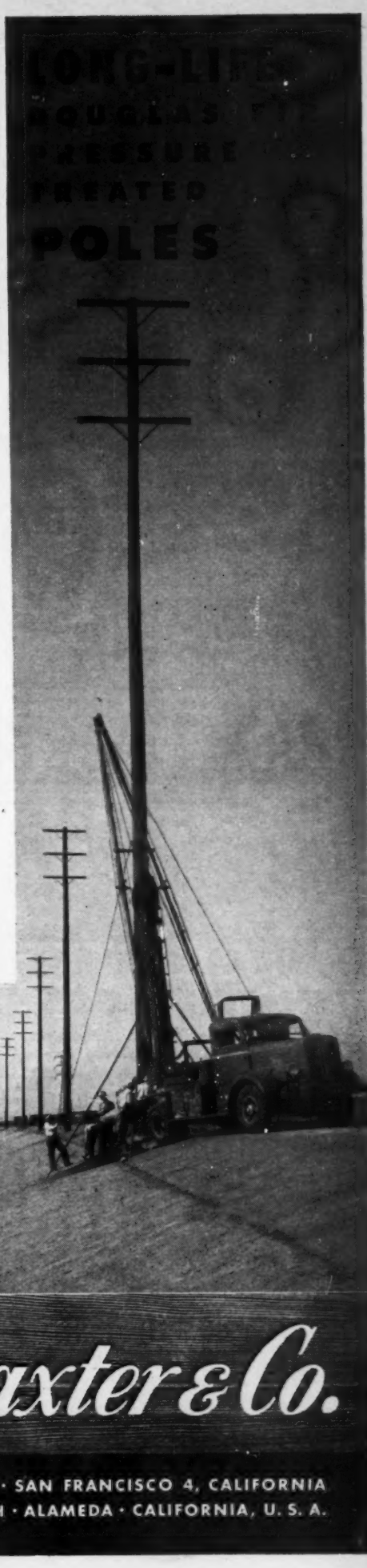
Other defendants in the case are General Electric Co., James R. Kearney Corp., Westinghouse Electric Corp., S & C Electric Co. Railway & Industrial Engineering Co., W. N. Matthews Corp., Porcelain Products Co., Royal Electric Manufacturing Co., Pacific Electric Manufacturing Co., and T. F. Johnson.

•

Raytheon Forms New Unit

Formation of a commercial products division to consolidate broadcast equipment, industrial electronics and other commercial departments formerly operated separately, has been announced by the Raytheon Manufacturing Co., Waltham, Mass. The consolidation of the former separate divisions and departments was made in order to correlate these facilities with production

BAXCO



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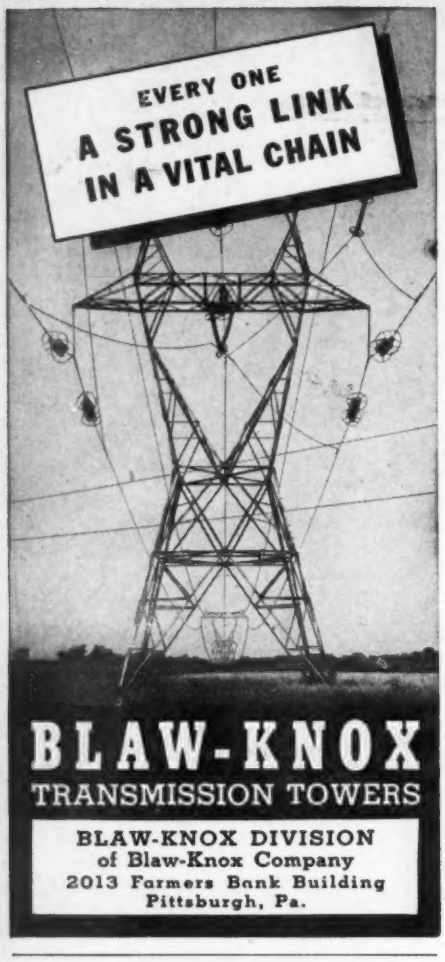

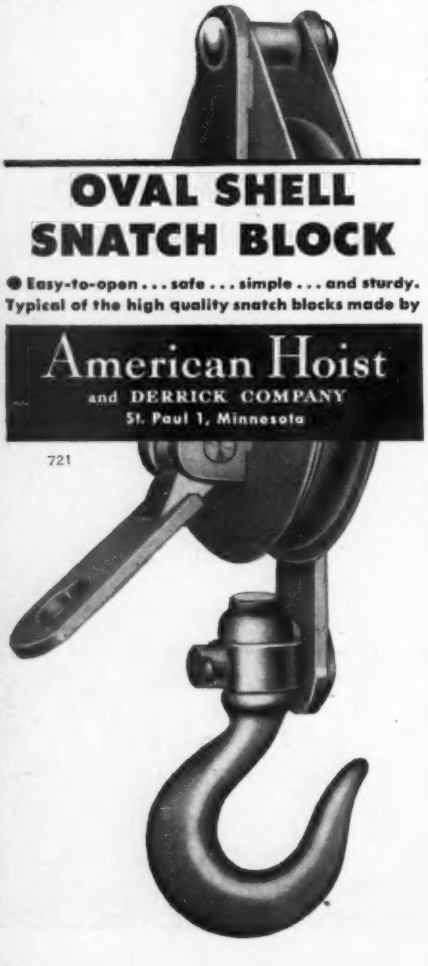
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and engineering facilities located at the company's main plants in Waltham. Frank S. Horning has been named sales manager of the new division and William A. Gray assistant sales manager.

•

Manufacturers Announce Plant Expansion Plans

Several electrical and allied manufacturing companies have announced recently plans for additions to plant facilities.

A plant that will be used to process the oils from the shells of cashew nuts after the meats have been removed is now under construction for the Irvington Varnish & Insulator Co., Irvington, N. J., on a ten-acre site fronting Newark Bay, the H. K. Ferguson Co., industrial engineers and builders, have announced. The process in the new $1,500,000 plant will consist of treating and reacting cashew nut shell liquid to produce various products sold under the tradenames "Cardolite" and "Harvel." These products are used in the manufacture of electrical insulating varnishes, bonding resins, etc. The Ferguson company is also designing and building a plant for the Irvington company for the manufacture of "Capseal" products, a line of coated papers, foil and cork combinations used in the sealing of glass containers.

Scoville Manufacturing Co., Waterbury, Conn., has awarded a contract to the Turner Construction Co. totalling approximately $2,000,000 covering building work in connection with an addition to the company's rolling mill, for which Stone & Webster Engineering Corp. are engineers and project managers and will install all mechanical and electrical equipment. The addition, which will be used for the housing of heavy modern equipment for cold rolling copper alloys in sheet and strip form, will be one story high and 1,250 ft. long by about 80 ft. wide. Approximately 180,000 sq. ft. will be contained in the addition.

Borg-Warner Corp. has acquired the steel works of the Chicago Railway Equipment Co. of Franklin, Pa. C. S. Davis, president of Borg-Warner, said $500,000 would be spent on additions to the plant.

General Electric Co. has formally opened at Anaheim, Calif, its new resin manufacturing plant, designed and built by Blaw-Knox Co. The Anaheim works cover six acres and will employ 60 people.

Manufacturers Make Sales Assignments

Electrical manufacturing companies have recently announced the following appointments to their sales staffs:

Line Material Co., Milwaukee, has announced the transfer of R. E. Peterson from the position of assistant manager of the Washington, D. C., branch to district manager in the Philadelphia territory.

Electric Products Co., Cleveland, has opened a new district office in Chicago at 915 Old Colony Building, 407 South Dearborn St. Robert R. Kovach is the Chicago district manager and is responsible for handling all sales and service negotiations in the territory.

The Okonite Co., Passaic, N. J., has appointed Edward A. Damrau manager of the company's new branch office at 601 Chamber of Commerce Building, Charleston, W. Va. Mr. Damrau will handle all electrical wire and cable sales in West Virginia and adjacent parts of Kentucky and Virginia for both Okonite and its Hazard Insulated Wire Works Division. He was formerly in charge of the company's Pittsburgh, Pa., office.

Bailey Meter Co., Cleveland, Ohio, has appointed the Portilla Corp. as its agent in Puerto Rico. This corporation has taken over the business formerly conducted by H. Clyde Gregory, Inc. It will act as the agency for the sales, installation and servicing of Bailey equipment in Puerto Rico, Republic of Haiti, Dominican Republic and the Virgin Islands.

American Transformer Co., Newark, N. J., has appointed The Electrical Distributors Co., Liberty Trust Building, Philadelphia, Pa., as exclusive representatives for sales to the electric utility and railroad accounts in the areas of eastern Pennsylvania, southern New Jersey, Delaware, Maryland and the District of Columbia.

Watco Engineering, Inc., Cleveland, has appointed Ford Reed as Ohio representative. A manufacturers' representative, Mr. Reed maintains offices at 242 Broadway, Youngstown.

Standard Transformer Co., Warren, Ohio, has appointed R. Thorp & Associates to handle the complete line of Standard transformers in the state of Kansas and the western part of Missouri. The Thorp organization is located at 20 West 9th Street Building, Kansas City 6, Mo.

The Dampney Co. of America, Boston, Mass., has appointed the Combustion Equipment & Insulation Co., 1900 Euclid Av., Cleveland, Ohio, as agent in the Cleveland area for the sale of Apexior and Thur-Ma-Lox protective coatings.

•

Opens New Coast Office

Steady growth of agriculture and industry in the San Joaquin Valley area of California has led to the opening of a new branch office of the Minneapolis-Honeywell Regulator Co. to service the territory, C. L. Peterson, Pacific regional manager, has announced. The

office is located temporarily at 1357 North St., Fresno, until permanent quarters can be obtained. Clyde N. Bradley, until recently in the San Francisco office of Honeywell, has been appointed district representative for the company.

•

Manufacturers Issue Earnings Reports

Among the electrical manufacturing companies that have recently issued statements of earnings are the following:

COPPERWELD STEEL CO.—For three months ended March 31, 1947, profit of $687,610 before taxes. After provision of $282,299 for federal and state income taxes and $150,000 set up as reserves for inventory fluctuations, net profit for the quarter amounted to $255,311, equivalent, after allowance for dividends on the preferred stock in the amount of $20,732, to 46 cents per common share on the 514,864 shares of common stock outstanding. In the first quarter of 1946 the company showed a net loss of $188,521.

SOLAR MANUFACTURING CORP.—Net income for 1946 amounted to $141,721 on net sales of $8,024,243, compared with $298,920 on an $11,928,287 volume in 1945. Results for 1946 were equal, after preferred dividends, to 41 cents a share on 319,576 common shares outstanding at the year-end and compared with 93 cents a share on 276,773 common shares in the public's hands at the close of 1945.

ADMIRAL CORP.—Net profits, after all charges, for the year ended December 31 were $1,888,625, compared with $711,310 for 1945. This is equivalent to earnings of $2.10 per share on 900,000 shares of capital stock outstanding in 1946 against $0.79 per share in 1945. Sales were up 15 percent to $36,169,850 from the 1945 figure of $30,533,756.

APEX ELECTRICAL MANUFACTURING CO.—Net profit of $263,178 in first quarter of 1947, after provision for estimated taxes. Profit before the tax provision was $425,178. The net amounts to 75 cents per share on common stock, after prior preferred dividends. Sales for the first three months totaled $7,152,220. Current operations are at an even higher rate, with sales volume now in excess of $2,500,000 a month.

•

Vote 65-Cent Dividend

Directors of the Arrow-Hart & Hegeman Electric Co., Hartford, Conn., have authorized the payment on July 1 of a 65-cent dividend on the new common stock. Shareholders received $1 on April 3 on the old shares which were split recently two-for-one on approval of stockholders. In 1946 the company declared on the old shares 50 cents in the first three quarters and a year-end of $2.50 in December.

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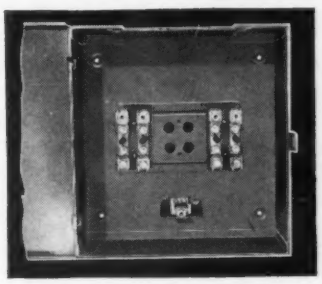

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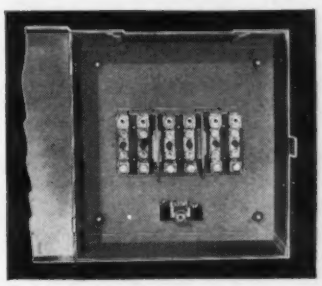

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Recent Rate Changes

UNION ELECTRIC CO., St. Louis, Mo., has filed a rate adjustment for electric service with regulatory authorities, which will equalize minor differences in its present rates to urban residential customers in Missouri, Illinois and Iowa. The principal differences which now exist in urban residential rates are the result of the acquisition of Laclede Electric properties by Union Electric in 1945. Since then, former Laclede customers have been served under the old Laclede rates. The proposed adjustment will reduce the revenue of the company by an estimated $703,637 a year, or 5.3 percent of Union Electric's total annual revenue. It will result in lower charges for electric service to 321,964 customers, no change in charges to 32,180 customers, and a small increase in charges to 10,749 customers.

JACKSON (TENN.) ELECTRIC DEPARTMENT will reduce its electric power rates approximately 9.4 percent effective July 1. Estimated annual savings, based on present consumption, total $58,000 under the new rate schedule. Of this amount, residential users will save $30,000, small commercial users will save $15,000, large commercial and industrial users will save $12,000 and street lighting will cost $1,000 less in round figures. Placing these estimated savings on a percentage basis, residential users will save about 13 percent over their present bills, small commercial users will save 12 percent, large commercial and industrial users 4.8 percent and street lighting savings will be 7.6 percent a year.

BROWNSVILLE (TEX.) WATER AND LIGHT DEPARTMENT will reduce its electric power rates 12½ percent, effective with July bills. The saving will aggregate $7,600 annually and will apply to both residential and commercial consumers.

PEACH SPRINGS (ARIZ.) POWER CO. has been authorized by the State Corporation Commission to increase its minimum charge for electric service from $1.50 to $3 per month.

•

Presenting "Tidy and Tall"

A completely new General Electric housecleaning combination, consisting of an upright floor-type vacuum cleaner and a 6½-lb. portable tank-type cleaner with five slip-on attachments, which has gone into production recently was unveiled at the Housewares Show held recently in Philadelphia.

Light and compact, the new combination, called the "Tidy and Tall," is designed for fast, easy cleaning of the whole room both on the floor and above the floor, A. L. Atkinson, manager of the company's electric vacuum cleaner division, stated.

The new portable cleaner is so light that it can be carried slung from the shoulder or held by the carrying strap. Despite its small size—14 in. long, 6 in. high and 6 in. wide—it has 75 percent of the suction power of a full-size tank-type cleaner. The upright floor cleaner is a re-styled version of the standard, single-speed G. E. cleaner.

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LETTER TO THE EDITOR

Two-To-One Ratio Denied

To The Editor of ELECTRICAL WORLD:

The editorial in the April 26 issue of ELECTRICAL WORLD refers to admissions by the American Gas Association and it is upon this point that I am taking the liberty of writing.

I know that you would not knowingly misquote the American Gas Association and, therefore, I call to your attention that the laboratory tests to which you refer have no bearing on the subject of commercial cooking. The American Gas Association has never carried out any commercial appliance laboratory tests.

The present American Standard Approval Requirements for commercial heavy-duty, hot-top ranges require a minimum hot-top efficiency of 50 percent. It would, therefore, not be possible for the comparison of gas and electricity to be on the basis of two to one as you have imputed to us. The facts, as disclosed by the Army investigation of actual metered cooking results in Veterans' Hospital kitchens using both gas and electricity, are in line with anticipated equipment performance.

I would appreciate publication of this letter so that your readers will not be under a misapprehension regarding work done by the American Gas Association in the commercial cooking field.

C. George Segeler
Engineer of Utilization
American Gas Association
420 Lexington Ave.
New York 17, N. Y.

(Note: ELECTRICAL WORLD will publish, soon, a response to the arguments in Mr. Segeler's letter. Editor)

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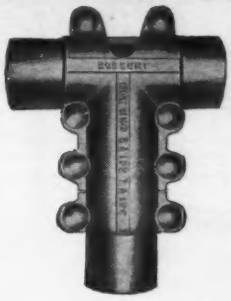
REA Approves Loans

The Rural Electrification Administration in April approved loans of $15,518,000 to 55 cooperatives and a public power district in 27 states. Most of the loans were to be used for the construction of 8,266 miles of distribution lines to serve 23,091 new consumers. Included in the total were loans to the Prince William Electric Cooperative, Manassas, Va., for the installation of a 1,000-kw. diesel generating unit, to the Central New Mexico Electric Cooperative, Inc., Corona, N. M., for one of 900 kw., and to the BARC Electric Cooperative, Millboro, Va., for the purchase of a site for a hydro plant and for equipment.



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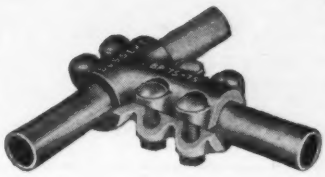

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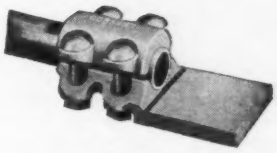

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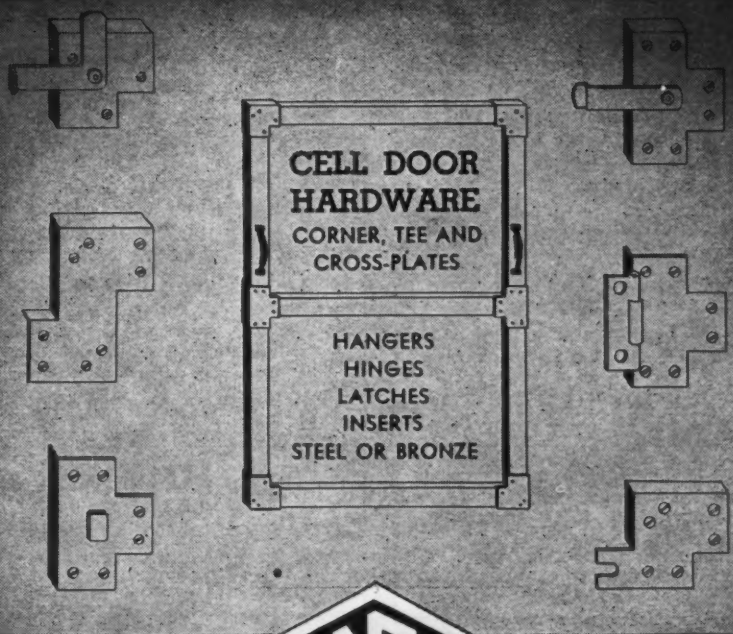

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